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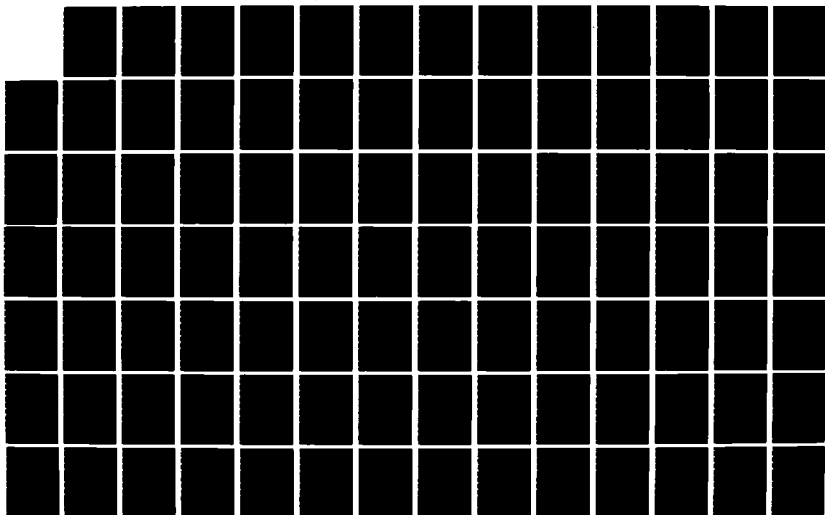
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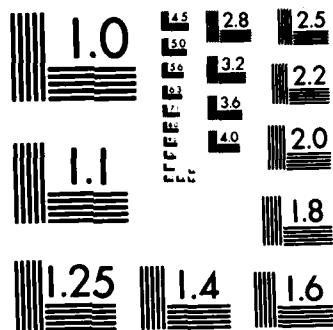
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ABSTRACT

There has been little research done that has attempted to study the patient's self-image and record what changes occur with a correction of the patient's malocclusion through orthodontic treatment. A study was done to determine what changes occur in the orthodontic patient's self-image during orthodontic treatment. A questionnaire requiring responses pertaining to self-image was distributed to three hundred sixty 11-19-year old patients in various phases of pre-treatment, treatment and retention. The data was collected and statistically analyzed. Variables of age, sex, and time in treatment were examined. Findings indicated a definite positive effect upon the orthodontic patient's self-image. Significant differences in response levels of different age groups, time in treatment groups and males and females were found. The effects on self-image were the largest during the first year of active treatment and remained at a higher level throughout treatment. The positive self-image levels continued through the retention phase of treatment.

A

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The dissertation of Brian Jacobusentitled

A Study of Patient's Self-Image During
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submitted to the department of Orthodonticsin partial

fulfillment of the requirements for the degree of Master of Science
in the Graduate School of Georgetown University has been read and approved by the
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June 20, 1985
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A STUDY OF PATIENT'S SELF-IMAGE
DURING ORTHODONTIC TREATMENT

A Dissertation
submitted to the Faculty of the Graduate School
of Georgetown University in partial fulfillment
of the requirements for the
degree of
Master of Science in Orthodontics

by
BRIAN B. JACOBUS, JR., D.D.S.

Washington, D.C.

June 1985



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TO MY WIFE PATRICIA AND DAUGHTER BRITTANY.

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I. INTRODUCTION

"What is beautiful is good." Misconception? Partial truth? Throughout time, man has placed an emphasis and importance on the beautiful. From fairy tales and legends to today's best sellers, the heroes and heroines are handsome and beautiful. The antagonists are frequently evil and ugly. Madison Avenue has based its very existence on this premise and research has supported them. The material goods we possess, the latest styles that we wear or the latest fads in mode, all are attempts to give us the image we desire, the beautiful look we want. It is also true in our personal appearance: whether we are tall or short, fat or thin, dark or light. It affects us every morning when we look in the mirror and judge our faces - our dental-facial features. This esthetic aspect touches everyone from the range of infant to that of the elderly.

It is the younger range of ages that is of specific interest in this paper. The importance placed on facial and dental esthetics by children is strikingly apparent. In 1980, Shaw(1) dealt with the causes of teasing by school-children. He found that 18.5 percent of teasing was directly related to a child's physical appearance (first was a child's name at 63.3 percent). The appearance of the child's teeth was the third highest characteristic picked out as a teasing point (next to height and weight) by

peers. Of more importance, teeth were first in causing the teased child the most distress! Over 60 percent chose teeth as the characteristic that they would least like to be teased about. This factor rated over clothes, weight, height, glasses, hair, noses, ears and eyes.

Dion,(2) in 1973, showed that children ages 3-6 showed a significant preference for attractive children as potential friends and a corresponding dislike of unattractive children. Attractive children were thought to be prosocial and vice versa.

Secord and Backman(3) reported in 1959 on malocclusions and psychological factors in society's attitudes toward malocclusion but indicated that little research had been aimed at the patient's reactions toward his own malocclusion. Story,(4) in 1966, wrote "relationships between psychology and dentistry, orthodontics included, have traditionally been ignored." Since that article, much has been discussed in the literature on the psychological aspects of the patient as they relate to various dental modalities. The orthodontic literature that has investigated these aspects can be categorized into the following major topics: 1) social and psychological issues pertaining to malocclusion, dento-facial form and facial esthetics, 2) psychological aspects of orthognathic

[surgery, 3) motives and expectations from orthodontic and orthognathic treatment, 4) profiles of cooperative orthodontic patients, 5) direct psychological effects of dental treatment on children, 6) esthetic malocclusion and self-evaluation assessment scales, and 7) post-treatment surveys of orthodontic and orthognathic patients.]

The one factor that was still missing from these categories and which was pointed out by Secord and Backman was research aimed at the patient's self-image toward his own malocclusion. Does this self-image change? How does it change and when? A knowledge of the patient's probable emotional responses might better enable the clinician to respond to that patient and even influence a particular mode of treatment for that patient.

It will be the purpose of this paper to examine the orthodontic patient's self-image before treatment, during treatment at different points, and after treatment to determine what changes, if any, occurred in the patient's self-image.

L

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II. REVIEW OF THE LITERATURE

Current psycho-dental literature can be divided into two main themes: 1) the social and psychological issues pertaining to malocclusion, dentofacial form and facial esthetics as viewed by society (i.e. malocclusions vs. social attitudes, vs. influencing teacher's expectations, vs. peer response, vs. socio-psychological problems in life, love and business) and 2) patient cooperation and expectations (i.e. direct psychological effects of dental treatment on children, motives and expectations from orthodontic and orthognathic surgery, profiles of cooperative orthodontic patients, esthetic, malocclusion and self-evaluation assessment scales, and post-treatment surveys or orthodontic and orthognathic patients).

The field of psycho-dental research is relatively young. Early articles noted the importance of the psychological aspects involving dentistry and its role in facial esthetics. These articles categorized the problems and called for more research in the field. Secord and Backman,(3) in 1959, noted that although the treatment of malocclusion was often based on a psychological factor, rather than a health factor, little research had been aimed at investigating these psychological factors and their underlying causes. They pointed out the two aspects of malocclusion: 1) the perception of the patient by other

persons and 2) the patient's reactions toward his own malocclusion and toward the way others behave toward him. They limited their studies to society's impression of the patient, yet they did suggest that more research be done in both aspects.

Another call for further research was published in 1963 by Fisk.(5) "The psychological effects of malocclusion should be classified, measured and weighed." He suggested the study of overt responses with direct questionnaire and the probing of covert responses by the observation of individual behavior within a group. Although the main thrust of the Fisk article was to establish some type of malocclusion index in order to better define malocclusion for professionals and the public, he noted the significance that a malocclusion can play on the psyche of the individual. A slight anterior crowding could represent a psychological trauma which would make the then existing public health indices of malocclusion merely "shadow images of their true public significance."

Story,(4) in 1966, remarked that interest in the relationship between psychology and dentistry was stirring but that it had traditionally been ignored or dealt with in non-acceptable techniques. He went on to deal with a wide range of topics from Freud's oral stage and the

importance of the tongue and mouth to motivational problems in adolescents. He concluded with a hope that the interrelationship between orthodontic and psychological workers be "a productive and respectable endeavor" and not merely a fad leading nowhere.

Psycho-dental research does indeed owe a debt to these early researchers in the field but it must be noted that they were preceded by a group of psychological researchers who felt that the individual's attitudes toward his body were of crucial importance toward his personality. These researchers felt, as their dental predecessors, that little attention had been given to this subject by their peers. In 1953, Paul F. Secord and Sidney M. Jourard(6) published an article that would lay the foundation for the next generation of research in body-image for psychologists and influence the thinking of psycho-dental researchers. Their study of body-cathexis (the degree of feeling of satisfaction or dissatisfaction with the various parts or processes of the body) supported their view that feelings about the body are commensurate with feelings about the self. Low body-cathexis was associated with anxiety in the form of undue concern with pain, disease, or bodily injury, and associated with a feeling of insecurity. An important note was that in their homonym-test of anxiety-related

body-cathexis, they included two factors: 1) the face (naturally) and 2) the teeth!

Fifteen years later, a follow-up article of Secord and Jourard's work was done by Rosen and Ross.(7) Their 1968 re-test agreed that body image and satisfaction with self-concept are positively related. They went one step further and felt that the measurement could be refined if the subjective importance of component aspects was given consideration.

Three related articles published in 1970 joined the ranks of Secord, Backman, Fisk and Story. MacGregor,(8) whose paper was actually presented in 1969 at NIDR, emphasized that not enough research was done on the psychology of facial disfigurement. Stricker(9) presented at the same meeting. His review of the literature of the time found the majority "replete with theoretical speculation, much of it psychoanalytic in origin and much of it unsubstantiated by research data." He found that carefully selected cases yielded little information about the extent to which changes in self-concept of the patient were widespread or generalized. Cohen(10) indicated the need for future systemic research concentrating on three areas: 1) a better socio-psychological and cultural dimension to the definition of malocclusion, 2) application

[of these dimensions to a continuum measuring degrees of malocclusion in order to achieve a priority treatment system and 3) develop methods of maximizing patient cooperation and satisfaction with treatment.

While there was a scarcity of literature dealing with self-concept of the patient, there was a ready supply of articles dealing with society's views of the individual's malocclusion and facial esthetics. The precursors to these studies were the psychologists and the social scientists studying the low but positive correlations between personality and somatotypes, as reported by Walker(11) (1963), Cortes and Gatti(12) (1965), Kagan(13) (1966), and Staffieri(14) (1967). In 1969, Lerner and Geller(15) studied 45 kindergarten children. A significant proportion identified their own and their peer's body builds correctly. Females were better at matching body builds than were males. Interestingly enough, no body build preference was noted by the majority, but a consistent aversion to chubbiness was expressed by 86 percent.

Studies involving facial esthetics were introduced in the 60's. Richardson et al.(10) (1961) found that children and adults displayed a culturally uniform tendency to view facial disfigurement and obesity with disfavor relative to [particular situations of having no other disability, an

amputated hand, a leg in a brace or being in a wheelchair! This study was a definitive move toward the study of facial esthetics as a focal point in self-concept studies.

In 1966, Linn(17) published one of the most extensive surveys reported up to that time dealing with dental appearance. It was found that a large majority of adults, irrespective of social background, recognized that dental appearance was of importance, particularly in interpersonal situations.

The research that Cross and Cross(18) (1971) carried out limited their focus to the perception of facial beauty. Three hundred subjects from age seven to adulthood made preference judgements on portraits. White females tended to down rate white males and vice versa. Blacks tended to rate higher than whites. Although no direct dental point was judged, the study marks an attempt to gauge a subject's preference for facial esthetics.

Dion(2) (1973) dealt with children's preference for facial attractiveness. Preschoolers aged three to six years old reliably discriminated differences in facial attractiveness. Their judgements were in the same direction as adult's judgements. This was in agreement with Cross and Cross, who also found no significant differences in esthetic judgement between different

[age groups. This lead to the inference that adults do influence children's acquisition of perceived facial esthetics. (It is not known at what age children begin to discriminate differences in facial attractiveness.) Supporting the "what is beautiful is good" premise, these preschoolers perceived the attractive children as more likely to behave socially and become friends, while unattractive children (especially males) were perceived as more likely to exhibit antisocial behavior.

Kleck, Richardson and Ronald(19) (1974) demonstrated a positive relationship between social acceptance judged from photographs and sociometric status after two weeks of interaction between 9-14 year old boys at a summer camp. It was suggested that the positive correlation between the two was due to relative physical attractiveness, even after the initial phases of interaction were over and behavioral input was generated.

As the literature and research has evolved, the psycho-social research has started to become more particular and focus on the saliency of dental appearance as the locus point to be studied. Prahl-Anderson et al.(20) (1979) had laypersons, general dentists and orthodontists evaluate a series of facial profiles and [photographs. While parents considered more of the examples]

acceptable and not requiring treatment, it was an example of employing dental deviation as a point of focus.

In 1980, Shaw, Meert and Jones(1) explored the extent to which deviant dental features exposed children to embarrassment. While dental features came fourth in the hierarchy of target features for teasing, the largest percentage of children that were upset by the teasing were the dental group. In a second part of the investigation, children were shown 12 children's faces to judge. In general, the more deviant the dental arrangement, the more salient it was. Shaw(21) carried this study one step further in 1981 by proposing the hypothesis that children with a normal dental appearance would be judged to be better looking, more desirable as friends, more intelligent, and less likely to behave aggressively. This hypothesis was upheld by both adult and child subjects. Again, the "what is beautiful is good" premise was borne out.

Another group of health practitioners that contend with altered body image through the manipulation of the facial complex are the plastic surgeons. Of primary concern is the patient's motivations and expectations of treatment. A number of articles in the medical literature have dealt with these aspects. Updergraff and Menninger(22) (1934)

looked at the psychiatric aspects of cosmetic surgery of the nose. Their work dealt with the motivations for surgery on marginal deformities versus the psychological impulse for surgery on severe deformity cases. They found that the incidence of psychiatric disorders was high among the group that was concerned with marginal disorders. They cited the need for plastic surgeons to realize that a more intimate cooperation between surgeons and psychiatrists might result in a better understanding of patient motivations.

Substantiating this article, Linn and Goldman(23) (1949) found that there was a correlation between surgical alteration requests and the existence of a psychiatric disorder. They interviewed rhinoplasty patients in an attempt to make an objective record of preoperative psychiatric status and to note postoperative psychiatric changes. They summarized that patients that presented themselves for rhinoplasty were ill from a psychiatric point of view and that psychologic changes initiated by rhinoplasty facilitated psychotherapy. Their theoretical basis for the observed changes was the special significance of the nose in the structure of the body-image.

MacGregor and Schaffer(24) (1950) also screened rhinoplasty patients. They found that the pre- and postoperative interviews had a therapeutic value, allowing patients and surgeons to more clearly see true motives. They stressed that an experienced psychologic investigator be made part of the surgical team, not only to evaluate surgical patients but to act as a liaison between doctor and patient. Stern et al.(25) (1957) pointed out the results which may follow cosmetic surgery in "neurotically motivated" patients. Appearance should be a concern to the surgeon as much as function.

Meyer et al.(26) (1959) conducted pre- and posttreatment interviews on females seeking elective rhinoplasties. They found that self-consciousness stemmed from the period of adolescence and that motivation differed with the age and life situation of the patient.

The motivations and possible psychiatric disorders of plastic surgery patients was the subject of Reich's(27) 1969 study. He felt that "any view that the only deformity of significance is the objective deformity... denotes a lack of sensitivity to the patient's feelings." He concluded that a psychiatric disorder is not a contraindication to surgery as long as the patient's expectations are realistic and that the patient can stand

[an imperfect result. ("Psychiatric disorder" can range from minor social withdrawal to aggressiveness to severe neurosis.)

The increase of orthognathic surgeries performed in the last 15 years has likewise increased the amount of literature dealing with psycho-dental considerations. Peterson and Topazian's(28) (1976) article on psychological considerations in midfacial surgery dealt with the need for psychological appraisal of the patient before treatment in order to better evaluate the probable risk of dissatisfaction on the patient's behalf after surgery. Their patients were classified into three groups: 1) highly positive reactors which were good risks, 2) neutral reactors which may require some postoperative attention but were generally good patients, and 3) negative reactors which were poor satisfaction risk patients. Pre- and postoperative counselling was a must for this group.

Jensen's(29) 1978 review of the literature dealing with reconstructive surgery, both cosmetic and maxillo-facial, found little information available about the psychological dimensions of the patient before or after surgery. The research done was found to be predominantly psychoanalytic and conclusions should be viewed "as tentative in view of [sample size, poor experimental design, lack of adequate]

[controls,... and imprecise, vaguely defined measuring criteria.]

Realizing the importance of self-concept of the orthodontic or orthognathic patient and the limited amount of literature dealing with the patient's self-image or effects on his personal lifestyle after treatment, Ouellette(30) (1978) conducted a study to determine effects on the patient before and after treatment. While 40 percent thought that surgery had no effect on their lifestyles, 83 percent had no reservations about going through treatment again. Ouellette, as many previous researchers had done, called upon the professions to realize that the personality of the patient is as important to assess as the physical abnormality.

Not all articles agreed with the mainstream thought concerning psychological motives. Olson and Laskin(31) (1980) felt it unnecessary to be concerned about not recognizing hidden motives on the part of the patient. They based this belief on the fact that 92% of their orthognathic patients were satisfied with the esthetic results of their surgery. They did emphasize that surgeons should provide more detailed explanations of what to expect from the surgery feeling that this would decrease psychological trauma and increase satisfaction.]

[Kiyak et al.(32) (1982) conducted a longitudinal study of 55 orthognathic patients. Satisfaction with surgery, self-esteem and body image peaked at 4 months post-treatment and declined at 9 months. Most of this decline was attributed to patients still undergoing orthodontic treatment. (No reason was given as to why they were still undergoing orthodontic treatment.) This agreed with Ouelette's view that as much orthodontic treatment correction be accomplished before surgery.

Heldt, Hoffke and Davis(33) (1982) wrote on the psychological and social aspects of orthognathic treatment. The pre-operative interview and cursory psychological evaluation were recommended in order to avoid the pitfalls leading to patient dissatisfaction. They agreed with previous articles that there was a high degree of satisfaction with orthognathic patients in contrast to problems associated with cosmetic plastic surgery patients.

One of the first studies to psychologically appraise children facing orthodontic treatment was done by Maj et al.(34) (1967). Not only was a personality evaluation effected but a follow-up evaluation was accomplished one year after the initial approach. One hundred school aged children were selected with an average age of 9 years.

[Frustration and aggressiveness were commonplace but their

[intensity lessened over the measured time period. The feeling of ugliness increased both in number and doubled in intensity!]

In 1968, Lewit and Virolainen(35) studied conformity and independence in adolescent's motivation for orthodontic treatment. Conformity and independence was determined by scores on the Text Anxiety Scale for Children and the Children's Social Desirability Scale. Positive attitudes were found in those patients with high conformity to adults or who had less need for peer approval or who had a more internalized locus of control. Self-image was not a variable in the study.

The advent of orthodontic research gave rise to researchers attempting to objectively rate malocclusions and their psycho-social effects by using different indices. Traditionally, Angle's classification served as the definitive guide until the 1950's. With the growth of orthodontics, it was realized by researchers and health officials that what was needed was not only a way to categorize malocclusions but also provide a basis for priority selection of patients for treatment.

Early attempts by Massler and Frankel(36) (1951) and by Vankirk and Pennell(37) (1958) were limited by their [concepts of single tooth occlusion. Both studies were]

proposed for the development of population surveys. Massler and Frankel recorded the number of maloccluded teeth in each individual. The total number of maloccluded teeth per person was the basis for evaluation of the prevalence and incidence of malocclusions in large groups of individuals. Van Kirk and Pennell rated malocclusions for the Public Health Services using their single tooth occlusal unit method as an epidemiological survey tool.

In 1960, Draker(38) proposed the Handicapping Labiolingual Deviation Index. This index was designed to meet the needs of epidemiological planners and was an improvement in that the concept of the unit of occlusion included the whole dental arch as well as the individual tooth. Grainger's(39) (1967) Treatment Priority Index introduced a new level to existing indices: it utilized a weighted scale to assign numerical values to various occlusal disorders as they were present in trial populations. Still absent from all of these indices was the judgement of esthetic implications regarding malocclusions.

One of the first and most widely employed indices utilizing esthetic awareness was the Eastman Esthetic Index developed by Howitt, Stricker and Henderson(40) in 1967 at the Eastman Dental Center. It was created in order to have

[an objective index by which researchers could measure the esthetic handicap in a way that could be measured by others. Over the years, it has proven to be simple, accurate, reliable and reproducible (44). Its value was further enhanced by providing guidelines of a mean esthetic value and a level of reflection on dento-facial body image that had not previously been available. The index considered measures of overjet, overbite, open bite, number of teeth crowded out of the arch, largest labio-lingual deviation of one tooth from the arch, number of rotated teeth, severity of the rotations, mandibular incisor alignment, diastemas, and anterior fractures. The main interest was the subjective questionnaire that this index used comparing the subject's responses to their own esthetics with that of the researcher's esthetic index judged from the subject's dental casts. There was a significant correlation between children's subscores on their judged casts, thus confirming the validity of the esthetic index. The importance of this was that it was the first study that correlated subject's self-image with an index.

Another example of a malocclusion assessment study was done by Salzmann(41) (1968). Actually, the published [article was a description of the A.A.O. Council on

[Orthodontic Dental Health's Handicapping Malocclusion Assessment Record. Intra- and interarch deviations were recorded and given a numerical point value. What was missing was an assessment of the psychological effect on the patient. There was one section for a yes or no response to the clinician's inquiry as to whether the subject thought that orthodontic therapy was needed. Unfortunately, that was the extent of any psycho-dental determination.

Practice management procedures have introduced various surveys to gauge patient satisfaction with treatment, office procedures, staff and expense. Callender et al.(42) (1976) sent out a 19 question patient-parent combination questionnaire to two hundred subjects. Self-image was indirectly touched upon in two questions dealing with the patient's satisfaction with appearance (posttreatment) and with desire for treatment. The article concluded that the use of a questionnaire could be used for uncovering patient attitudes toward improved self-image and orthodontic treatment, a consideration that the authors felt had received virtually no attention.

Realizing "that every practitioner of dentistry who has recommended orthodontic treatment for patients has done so [with an appreciation of the esthetic element", Katz(43)]

(1978) sought to determine the relationship between eight widely used orthodontic indices and the patient's self-image satisfaction level, using the four self-image questions employed by the Eastman Esthetic Index. An attempt was made to find which of the orthodontic malocclusion indices were associated with the psycho-social component of treatment. The greatest magnitude of significance in detecting esthetic satisfaction or dissatisfaction was shown by Angle's classification. Regardless of the indices used, though, the direction of the trend was that the higher the score on any of the indices, the more likely the subject was to respond negatively on self-satisfaction with his teeth or smile.

The Katz study was important in that it added psycho-social factors to its research. Graber and Lucker(44) (1980) carried this one step further and determined that there were sex-specific correlates to these factors. Using a self-image questionnaire, they found there was a broad range of what was considered dentally acceptable by the subjects. Overall, there was a strong positive bias in personal attractiveness and dental attractiveness. Eighty percent showed positive feelings toward their teeth. The primary concern of females was overjet and its influence on dental esthetics. Males had

more concern over localized dental crowding. The study concluded that deviations in dental form that adversely affect facial outline are more important to girls than to boys.

The latest study rating malocclusion with psycho-social factors was done by Fox et al.(45) (1982). They acknowledged that the evaluation of malocclusion must consider esthetic and psychological factors as well as physical and functional ones. With this in mind, they created the Orthodontic Attitude Survey toward malocclusion and orthodontic treatment. There were no concrete results of their survey, except that the reliability and validity of the questionnaire was established statistically. They suggested that the survey be subjected to the more vigorous test of a predictive study.

The measurement of the personality has been an attraction to those orthodontic researchers attempting to gauge or predict patient cooperation. Allan and Hodgson(46) (1968) comprised a study employing the Maryland and Parent Attitude Survey, the Adjective Check List, age, sex, and a cooperation criterion from the subject's clinician. Age was found to be the best single predictor of patient cooperation, with younger patients being more cooperative. The ideal patient evolving from the

[results of their study was one that was 14 years old or younger, enthusiastic, outgoing, wholesome, self-controlled, responsible, trusting, determined to do well, forthright and obliging. There was a lack of statistical significance in the study which led the authors to believe that "the self-concept of the child himself is the determinant in cooperation in orthodontic treatment."

Contraindicating portions of this study, McDonald(47) (1972) used three scales in rating patients. These scales were designed to measure the severity of malocclusion, the cooperation of the patient and the doctor's liking of the patient. There was no significant correlation between the age of the patient and his cooperation. Rather, there was a high correlation between doctor-patient liking and patient cooperation.

Burns(48) (1970) used a personality rating scale in an attempt to identify cooperative orthodontic patients. It was found that the mean score for the cooperative groups was higher for each trait than that for the uncooperative group. Twenty traits were tested with four traits not being significantly different: intelligence, nervousness-calmness, boisterousness, quietness and sense of humor. The study concluded that there was a definite

[relationship between how a person cooperates in school and how the same person reacts to his orthodontic treatment. Cooperation appeared to be a manifestation of basic personality rather than related to a particular treatment.]

In 1974, Crawford(49) performed a multiple regression analysis of patient cooperation using 24 independent variables. Age of the patient and the locus of control personality trait of both the mother and patient were significantly related to good cooperation. Despite this, the study concluded that it was not possible to develop a means of making a reasonable prediction of cooperation to be expected from a beginning orthodontic patient.

Cooperative and non-cooperative orthodontic patients of at least one year duration and their families were surveyed in an attempt to profile the excellent orthodontic patient. Starnback and Kaplan(50) (1975) found that there was no correlation between either severity or time in treatment and cooperation. Greater cooperation was shown by younger patients, more optimistic patients, and those patients respected by the clinician. The study's profile of the excellent orthodontic patient was a Protestant or Catholic female living in a rural or industrial

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neighborhood whose father was a non-self-employed blue-collar worker.

Basing their study on younger aged patients being more cooperative, Weiss and Eiser(51) (1977) found through surveys completed by clinicians that patients under 12 were more cooperative in wearing of headgear and other removable appliances but less cooperative in keeping appointments or breaking appliances.

The wearing of headgear was used as a determinate of patient cooperation in a study by Clemmer and Hayes(52) (1979). Coupled with a locus of control inventory, a malocclusion index and a self-perception test, positive significant factors toward wear of headgear were apparent in girls, in patients who had better ratings of school and clinic cooperation, and in those patients who felt that their malocclusions were severe. In accord with McDonald, they concluded that age had no bearing on headgear wear for the ages of 11 to 17.

It is only recently that comparison or longitudinal studies have been done dealing with the body-image and self-concept of orthodontic patients. As late as 1977, Dorsey and Korabik(53) performed a longitudinal study on the self-concept changes of 97 orthodontic patients after 7 months in treatment. After administering the Tennessee

Self-Concept Scale before banding and then again at the 7 month mark, they saw a significant increase in the level of self-concept satisfaction. Neither the initial level nor the subsequent level were affected by age, sex, Angle molar classification, or type of treatment.

Klima et al.(54) (1979) compared body image and self-concept levels between prospective orthodontic patients and orthodontic patients in retention. Interestingly, they found no significant difference in body-image and self-concept between the two groups. They did find that girls scored significantly lower in both body-image and self-concept satisfaction than did boys. Also, Class III malocclusion patients scored significantly lower in all categories.

The latest study dealing with psycho-social effects of malocclusion was a 15 year longitudinal study of orthodontically untreated Danes. Helm et al.(55) (1985) recorded malocclusions in 977 Danish adolescents in 1965-66 and followed them 15 years later with a questionnaire concerning general questions about body-image and specific questions about self-perception and social implications of dental appearance. In both adolescence and adulthood, unfavorable perceptions of the teeth were expressed significantly more often by subjects with extreme

malocclusions. It was concluded that certain malocclusions, especially extreme maxillary overjet and conspicuous space anomalies, may adversely affect body-image and self-concept in adolescence and in adulthood.

As can be seen and readily appreciated from a review of the past and current literature, more research in the psycho-social field of self-image pertaining to dento-facial esthetics is needed. On an optimistic note, the impetus for more research has increased with the increased realization of the implications toward treatment and the importance to the orthodontic community that the field contains. It is with this view in mind that this paper will attempt to make a contribution to the field.

III. HYPOTHESIS AND PURPOSE

Hypothesis - Orthodontic treatment changes the self-image of the orthodontic patient.

Purpose - To determine what occurs to the self-image of the orthodontic patient before, during and after orthodontic treatment and what effect the variables of age, sex and time in treatment have on that self-image.

IV. METHODS AND MATERIALS

This study consisted of 360 patients between the ages of 11 and 19. There were 184 females and 176 males. The children were all patients at the Orthodontic and/or Pedodontic Clinics at Georgetown University School of Dentistry in Washington, D.C.. The subject group may be characterized as diverse: lower to middle class, various racial and ethnic originations from various white- and blue-collar families.

The data for this study was collected from questionnaires given to active patients seen in the clinic. The child filled out a 14 part questionnaire which was completed only once at whatever time in treatment that the patient happened to be in. Embodied in the form were questions on self-evaluation of faces and teeth, peer's appearance and peer acceptance. The patients were told that the questionnaire was a survey in which the results would be used as a guide to provide better services for the patients in the clinics.

Two similar questionnaires were used in the survey: one for pedodontic patients that had not had active orthodontic treatment (Figures 1 and 2), and one for patients that had received orthodontic treatment (Figures 3 and 4). The questions were formulated to assess the patients 1) [satisfaction with self, both facially and dentally, 2) the]

Figure 1

DENTAL SURVEY

Thank you for your assistance in filling out this questionnaire. Please place the letter to the answer that best describes you in the space provided. The results of the survey will be used to provide better service to our patients.

- ____ 1) Sex (M or F)
- ____ 2) Age
- ____ 3) How satisfied are you with the general appearance of your teeth?
 - a. very satisfied
 - b. mildly satisfied
 - c. mildly unsatisfied
 - d. very unsatisfied
- ____ 4) How satisfied are you with the appearance of your smile?
 - a. very satisfied
 - b. mildly satisfied
 - c. mildly unsatisfied
 - d. very unsatisfied
- ____ 5) How satisfied are you with the way you look?
 - a. very satisfied
 - b. mildly satisfied
 - c. mildly unsatisfied
 - d. very unsatisfied
- ____ 6) Compared to your classmates, how do your teeth look?
 - a. among the nicest
 - b. better than average
 - c. below average
 - d. among the worst
- ____ 7) Are you a happy person?
 - a. almost always
 - b. sometimes
 - c. almost never
 - d. never
- ____ 8) Do your classmates make fun of the way your teeth look?
 - a. almost always
 - b. sometimes
 - c. almost never
 - d. never
- ____ 9) Do your classmates compliment you on your teeth?
 - a. almost always
 - b. sometimes
 - c. almost never
 - d. never

Figure 2

- _____ 10) How many of your friends have braces?
- a. almost all
 - b. some
 - c. almost none
 - d. none
- _____ 11) Do you recommend braces to your friends if you think its needed?
- a. almost always
 - b. sometimes
 - c. almost never
 - d. never
- _____ 12) Do you wish that you had braces?
- a. almost always
 - b. sometimes
 - c. almost never
 - d. never

Thank you for filling out this questionnaire. If you have any questions, please ask your dentist. He will be glad to assist you.

Figure 3

DENTAL SURVEY

Thank you for your assistance in filling out this questionnaire. Please place the letter to the answer that best describes you in the space provided. The results of the survey will be used to provide better service to our orthodontic patients.

- ___ 1) Sex (M or F)
- ___ 2) Age
- ___ 3) Time in Braces (0 if no braces yet)
- ___ 4) Time in Retainers (0 if no retainers yet)
- ___ 5) How satisfied are you with the general appearance of your teeth?
 - a. very satisfied
 - b. mildly satisfied
 - c. mildly unsatisfied
 - d. very unsatisfied
- ___ 6) How satisfied are you with the appearance of your smile?
 - a. very satisfied
 - b. mildly satisfied
 - c. mildly unsatisfied
 - d. very unsatisfied
- ___ 7) How satisfied are you with the way you look?
 - a. very satisfied
 - b. mildly satisfied
 - c. mildly unsatisfied
 - d. very unsatisfied
- ___ 8) Compared to your classmates, how do your teeth look?
 - a. among the nicest
 - b. better than average
 - c. below average
 - d. among the worst
- ___ 9) Are you a happy person?
 - a. almost always
 - b. sometimes
 - c. almost never
 - d. never
- ___ 10) Do your classmates make fun of the way your teeth look?
 - a. almost always
 - b. sometimes
 - c. almost never
 - d. never

Figure 4

- _____ 11) Do your classmates compliment you on your teeth?
 - a. almost always
 - b. sometimes
 - c. almost never
 - d. never
- _____ 12) How many of your friends have braces?
 - a. almost all
 - b. some
 - c. almost none
 - d. none
- _____ 13) Do you recommend braces to your friends if you think its needed?
 - a. almost always
 - b. sometimes
 - c. almost never
 - d. never
- _____ 14) Are you glad that you are getting, or have, braces?
 - a. very glad
 - b. sometimes
 - c. almost never
 - d. never glad

Thank you for filling out this questionnaire. If you have any questions, please ask your orthodontist. He will be glad to assist you.

ability to compare facial and dental esthetics of peers with self, 3) satisfaction with wearing braces, and 4) association with peers who wore orthodontic appliances. Each question had 4 possible answers ranging from a strongly positive answer to a strongly negative response. The questionnaire was a composite made up of questions taken from the Eastman Esthetic Index, various studies previously reported (30)(42)(44). This was done to allow future comparison of results between this study and other reports using the previously reported formats.

Three main groups were categorized: Control, Treatment, and Retention. The control group consisted of 109 subjects between the ages of 11-19. Forty-six males and sixty-three females from the pedodontic department responded to the questionnaire. The treatment group consisted of 205 patients that had had active orthodontic treatment started at the orthodontic clinic. One hundred-ten males and ninety-five females responded. The retention group consisted of 46 patients of which 20 males and 26 females answered questions. The resultant data was collected and analyzed.

Statistical evaluation of the data was done by grouping the participants into the following data sets: sex, age, time in treatment (no treatment, one year of treatment or

less, over one year to two years of treatment, over two years of treatment, and retention), and a control group in which no treatment had been started or was anticipated. These sets were divided for the purpose of comparison and analysis. The data was measured by setting a value of 4.0, 3.0, 2.0, and 1.0 to each questions response: a strongly positive response received a 4.0, a strongly negative answer rated a 1.0

Mean, standard deviation, standard margin of error, and ranges of sets to the .10, .05, and .01 levels of significance were computed for each set of questions for the different comparison groups. The means and ranges to the .10 confidence level were compared and plotted on graphs. Disjointedness of sets was determined to be indicative of significance. The amount of overlap between sets and the amount of disjointedness determined the presence of, or lack of, significance. Trends were determined by a collective assessment of groups of responses that were not significant by themselves.

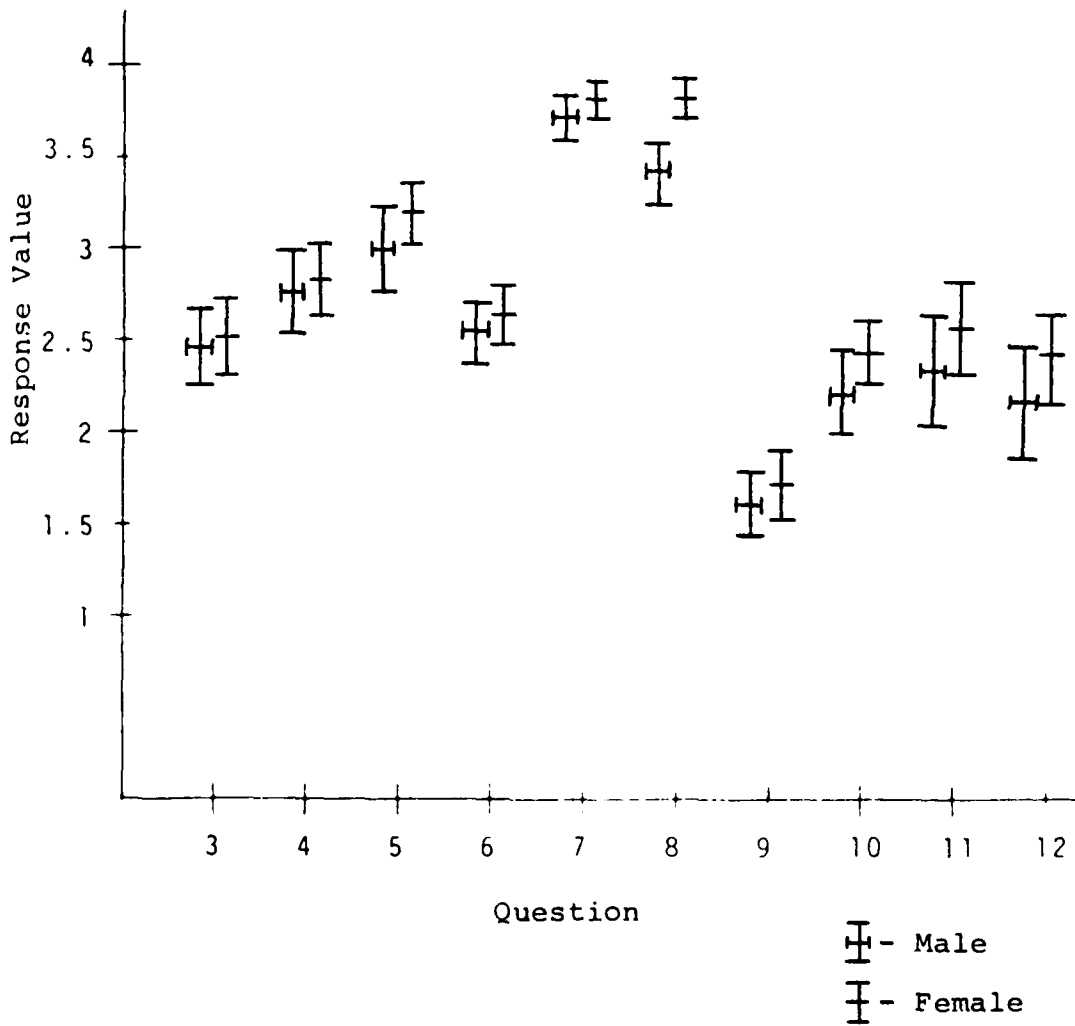
V. FINDINGS AND DISCUSSION

In the following section, different data sets were compared in order to determine if there existed any significant differences in responses between various groups. Data sets were categorized according to the different variables to be compared. The list of main data sets consisted of control group, treatment group, and retention group. These main data sets were then subdivided by the use of the variables of age, sex and time in treatment. These subdivided data sets were compared internally within their own main data groups and then compared outside their groups against one another. The following discussion detailed those comparisons.

The Control Group (Graph 1) consisted of 109 subjects treated in the Pedodontic Department of Georgetown Dental School that had not been screened via consultation or treated in the Orthodontic Department. Forty-six males with a mean age of 15.45 years and 63 females with a mean age of 15.55 answered the questionnaire provided at the Pedodontic front desk. The age range was limited to patients between the ages of 11-19.

Graph 1 showed the comparison of males versus females with a trend toward females being more satisfied with themselves in all responses. Females were more satisfied with the general appearance of their teeth, with their

CONTROL GROUP
MALES vs FEMALES



Graph 1

smiles, with the way they looked, with their own comparisons with their classmates' dentitions, and in general, were happier than their male counterparts. In response to the question on teasing, females showed a significantly higher response to not being teased (3.825) compared to males (3.413). While both groups expressed a high rate of denial of teasing, neither group had a high rate of being complimented. In comparison to each other, though, females (1.730) rated slightly higher than males (1.680) at receiving compliments. Females also responded on a more positive note to having friends with braces, recommending braces to their friends, and the desire for orthodontic treatment for themselves.

It was of interest to note that these results differed with some of the published literature. The Eastman Esthetic Index study(40) and Graber's study(44) saw no difference in responses between the sexes while the study by Klima et al.(54) reported that females scored significantly lower in self-image and body-image satisfaction than did males. This study showed a slight, though not significant, trend toward females having a higher response than males.

Shaw(1) found that males were more likely to tease their peers although he found an equal amount of victims of

both sexes. Males were teased significantly more than females in this study. Perhaps the males in this study tended to tease their male peers more than their feminine counterparts.

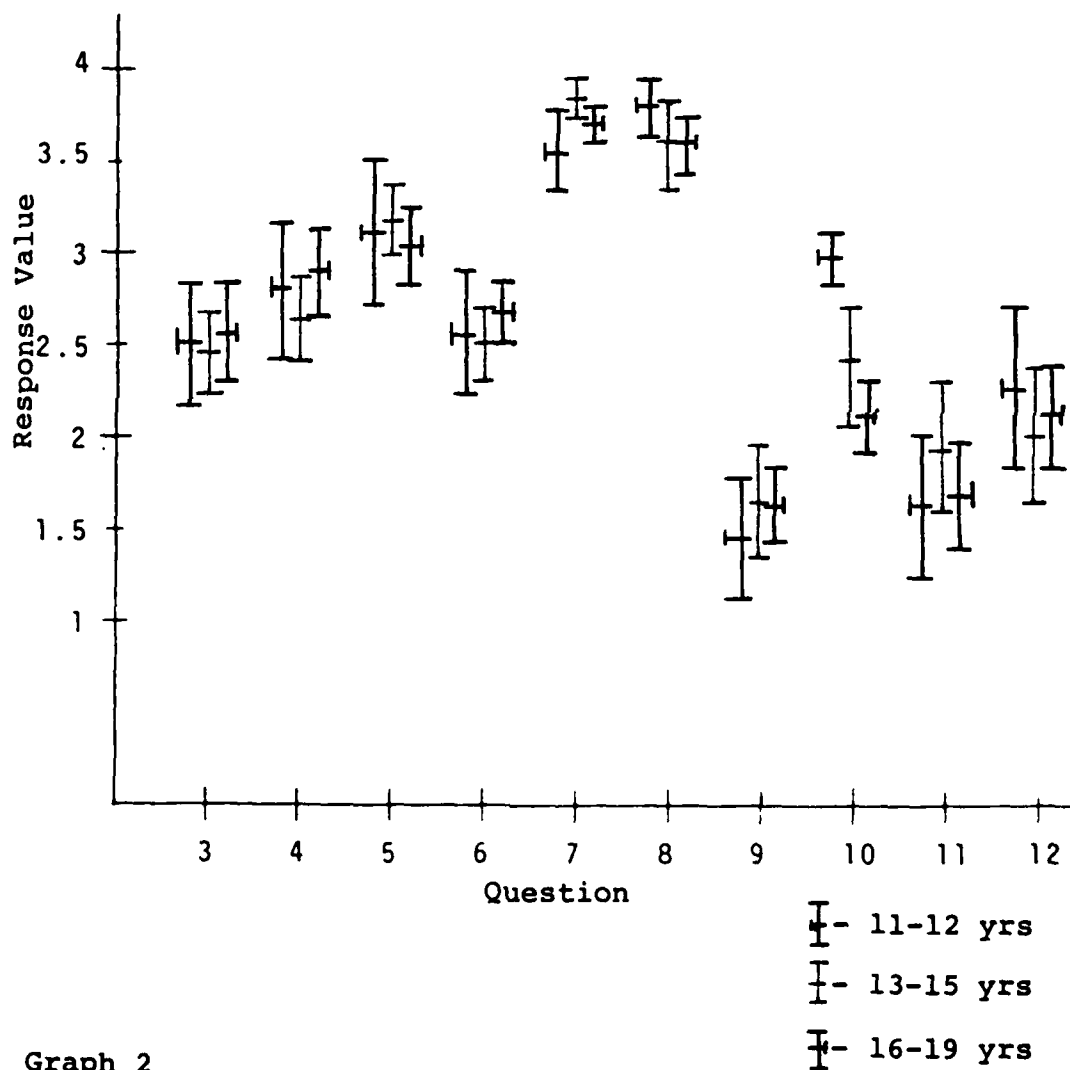
Although females had a higher self-satisfaction level than the males, the females had more desire for orthodontic treatment. Whether this was due to an increased awareness or scrutiny of body parts, an influence by orthodontically treated friends, or conversely, a down-rating by the males, was open to conjecture and more study.

A comparison between ages (Graph 2) was made of the Control Group with ages divided into three groups: 1) Seventeen 11-12 year olds with a mean age of 11.6 years, 2) Twenty-nine 13-15 year olds with a mean age of 14.0 years, and 3) Forty-eight 16-19 year olds with a mean age of 17.3 years. A comparison of sexes in each age group would have been ideal but it was felt that the subject pool was not large enough to accomplish a comparison with any resultant statistical confidence.

Response to satisfaction with appearance of teeth, of smile and comparison of teeth to classmates showed no significant differences but did follow a trend of being slightly more positive in the 11-12 year old group, a slight drop in the 13-15 year old group and a return and

CONTROL GROUP

11-12, 13-15, 16-19 Years Old



Graph 2

subsequent higher response in the 16-19 year old group. The exact opposite was noted in response to satisfaction with the subject's appearance. The 13-15 year old group was most positive followed by the 11-12 year olds and then the 16-19 year olds. This may have been in response to an increased awareness of the subject's body-image.

All three groups had a high level of happiness with the 11-12 year olds responding less positively. There was a high rate of denial to teasing by all groups with the strongest denial made by the 11-12 year old group. Conversely, there was a low rate of compliments with the lowest group being the youngest.

There was a significant difference between the 11-12 year olds and the older groups in regard to the number of friends with braces. The response decreased with an increase in age. The 11-12 year old group responded at the 3.0 level compared to 2.41 and 2.14 for the 13-15 year olds and 16-19 year olds respectively. This was in contrast to comparisons later in this study in which the 13-15 year olds rated highest in the Treatment Groups. While there was insufficient data to make a definitive statement, it may be conjectured that this pool of patients either found friends with braces less desirable as age increased or the number of orthodontic patients decreased with increased

age.

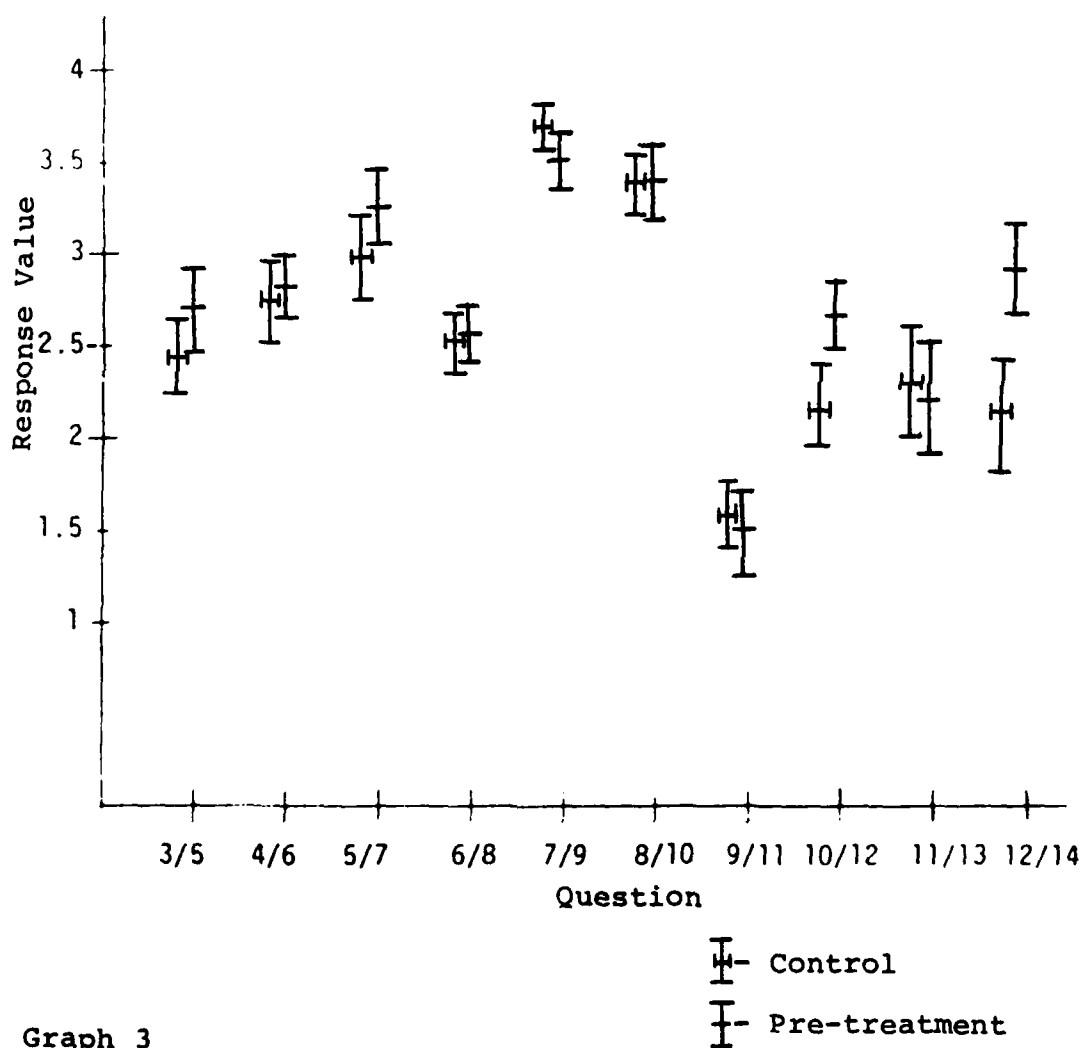
The recommendation of braces to friends was higher in the 13-15 year old group and about equal in the other two groups. If it were thought that the 11-12 year olds were not affected by having friends with braces, while the older age groups found friends with braces less desirable, this information might hold true for the older groups which paralleled a drop in friends with braces with a drop in recommending braces to friends. But the 11-12 year old did not hold true to this pattern having dropped lower than both groups in respect to recommending orthodontic treatment.

There was no significant difference between the groups in their desire to have braces. The 11-12 year old group did register a higher desire for treatment than the other groups which seemed to parallel the higher amount of friends with braces yet seemed to contradict the lower rate of recommending them. The recommendation of braces to friends may have been due to forces entirely independent from the desire to associate with or have braces.

A comparison between the male control group and the male pretreatment group was made (Graph 3). The male pretreatment group consisted of 37 male subjects, having a mean age of 12.94 years, seen either on a consultation

CONTROL vs PRE-TREATMENT

Males



[basis or for initial records in the orthodontic] department. The control group consisted of 46 male subjects with a mean age of 15.45 years.

The pretreatment group had higher satisfaction ratings for general appearance of teeth, appearance of smile, satisfaction with looks, and comparisons with classmates' teeth. The control group had a higher happiness level. None of these differences were significant.

In response to teasing, the pretreatment group compared equally with the control group, yet ranked at a slightly lower level in receiving compliments on dentition. This was interesting because they responded on a higher level on all of the appearance and comparison questions. Although there were no significant differences, there were measurable differences noted.

Significantly, there was a difference in the amount of friends with braces in the pretreatment group (2.702 vs. 2.195). There was also a significant difference in the enthusiasm for getting braces. The pretreatment group rated higher (2.973) than the control group (2.152) in its outlook to receiving braces. Although there was an age difference of approximately 2.5 years, these differences were still seen when the pretreatment group was [super-imposed with the 13-15 year old control group. The]

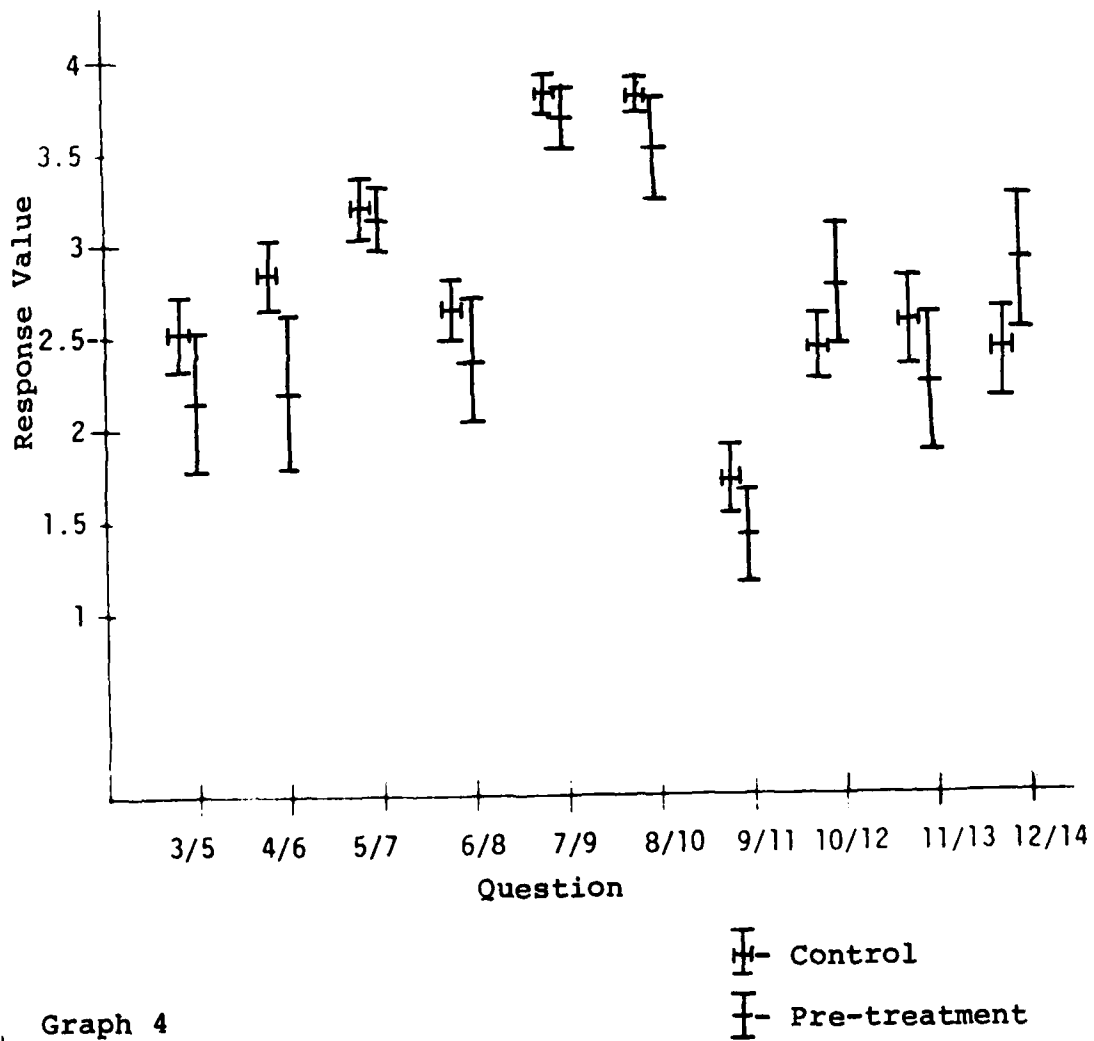
[difference between the amount of friends with braces was slightly less and the difference in enthusiasm for orthodontic treatment remained approximately the same. The differences noted might simply be explained as a greater level of awareness and excitement over treatment possibilities on the part of the pretreatment group. Having been made aware of orthodontics on a more personal level, they may have noticed more of their friends with braces and were more excited about treatment for themselves.

The female control group and the female pretreatment group were compared (Graph 4). The female pretreatment group consisted of 24 female subjects with a mean age of 13.12 years who, like their male counterparts, were either seen on a consultation basis or for initial records in the orthodontic department. The control group consisted of 63 subjects with a mean age of 15.55 years. The difference in mean ages was 2.43 years.

The female pretreatment group downrated themselves in comparison to the control group in regard to satisfaction with teeth, appearance, and in comparison to their classmates' teeth. There was a significant difference in their satisfaction level to the appearance of their [smiles. The control group recorded a mean of 2.85 while]

CONTROL vs PRE-TREATMENT

Females



the pretreatment group recorded a mean of 2.20. This was in contrast to their male counterparts.

The pretreatment group was also recorded lower for happiness, tended to be rated higher for teasing, and complimented less. Although not on as a significant level as their male counterparts, the females did have more friends with braces and were more enthused about the possibility of receiving treatment. Interestingly enough, the pretreatment females, like the pretreatment males, were less likely to recommend orthodontic treatment to their friends although they themselves were enthusiastic about it.

When the 13-15 year old control group was superimposed on the pretreatment group, the trends were the same across the board. There was less significance but still more dissatisfaction in comparative smile appearance. They still had more friends with braces and significantly more enthusiasm about receiving treatment than the control group. As for the males, these differences might be attributed to an awareness of the probability of impending orthodontic therapy.

Male subjects in active orthodontic treatment were compared (Graph 5) on the basis of three age groups: 1) 11-12 year olds (23 subjects with a mean age of 11.43 years)

and a mean treatment time of 6.82 months), 2) 13-15 year olds (76 subjects with a mean age of 14 years and a mean treatment time of 16.34 months), and 3) 16-19 year olds (29 subjects with a mean age of 16.55 years and a mean treatment time of 24.86 months). It was noted that the mean time in treatment increased with the increase in age of the subjects. Therefore, the trends and differences noted were based not only on a variable of age but also on time in treatment.

There were two areas of significance in comparing the three groups. The 13-15 year olds scored higher on the amount of friends with braces (3.01 vs. 2.56, 2.62). This was to be expected as the 13-15 year old group was usually the most orthodontically active segment of the population. In this study, the number of 13-15 year olds surpassed the other two treatment groups approximately 3 to 2.

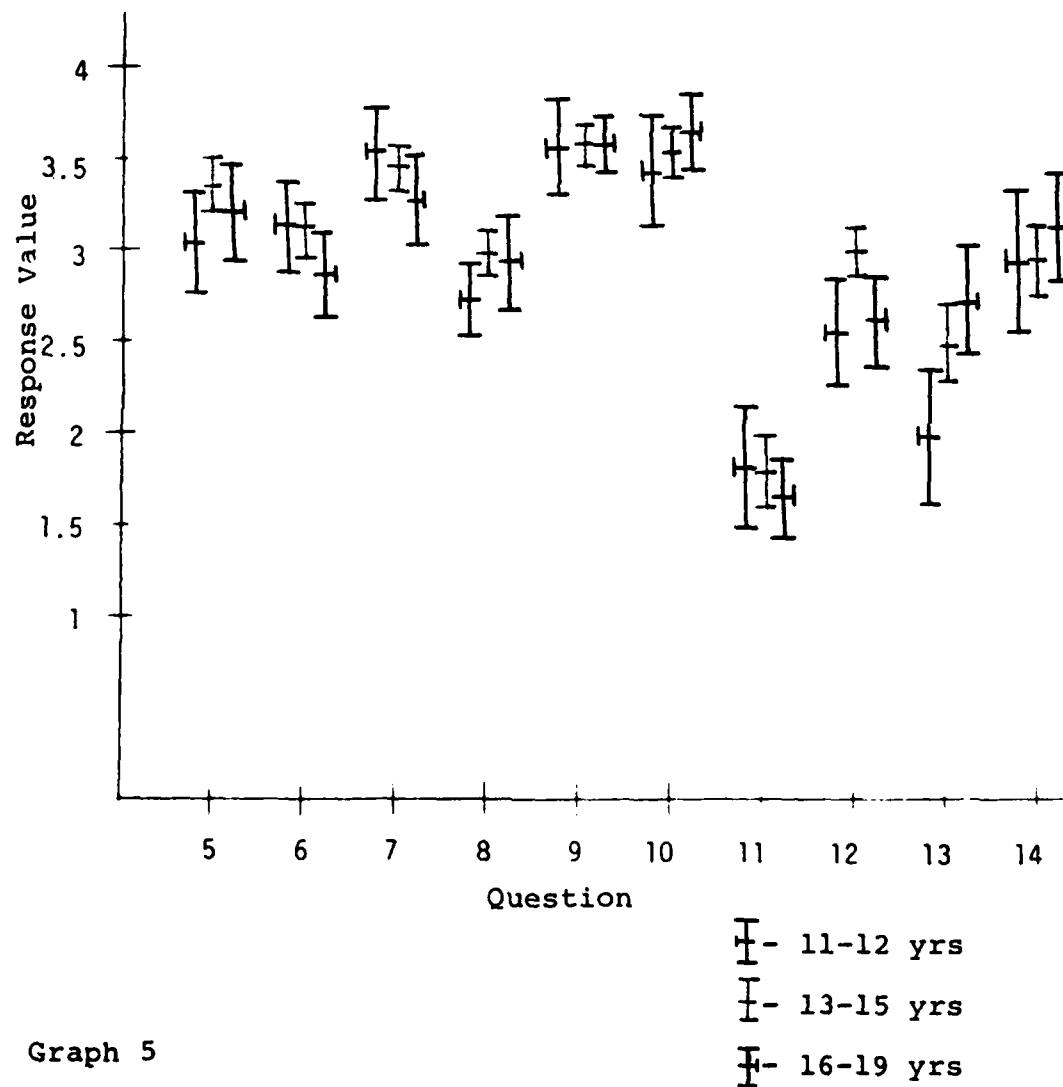
The other area of significance was in the recommendation of treatment. There was an increase in the recommendation of braces with an increase in the age of the patient (2.0 vs. 2.52 vs. 2.72). There was also a higher rate of acceptance toward having received treatment with the increased age (although not a strongly significant rise).

Comparing self-satisfaction questions, the 13-15 year

TREATMENT

MALES

11-12, 13-15, 16-19 Years Old



olds rated higher in appearance of teeth and in comparisons with classmates' dentitions. There was a trend toward lower scores with increased age concerning satisfaction with appearance of smile and general appearance. All groups measured approximately the same in happiness level. It appeared that with increased age there was more distinction able to be made between the relative straightness of the teeth and the esthetic value that the appliances made on the teeth while smiling. Throughout the study, there was a downrating of general appearance with increased age. It might be that there was an increased consciousness of self-image and more critical view of body-image with increased age.

There was a trend toward less teasing with increased age, parallel with an increase in maturity and treatment time. Conversely, there was a decrease in the amount of compliments received, possibly due to the decrease in the novelty of having braces and the relatively smaller number of patients wearing appliances. They would tend to receive less compliments than their counterparts already through with treatment.

Superimposing the treatment male groups on the control age groups, it was found that the treated males rated higher across the board. There was a significant increase

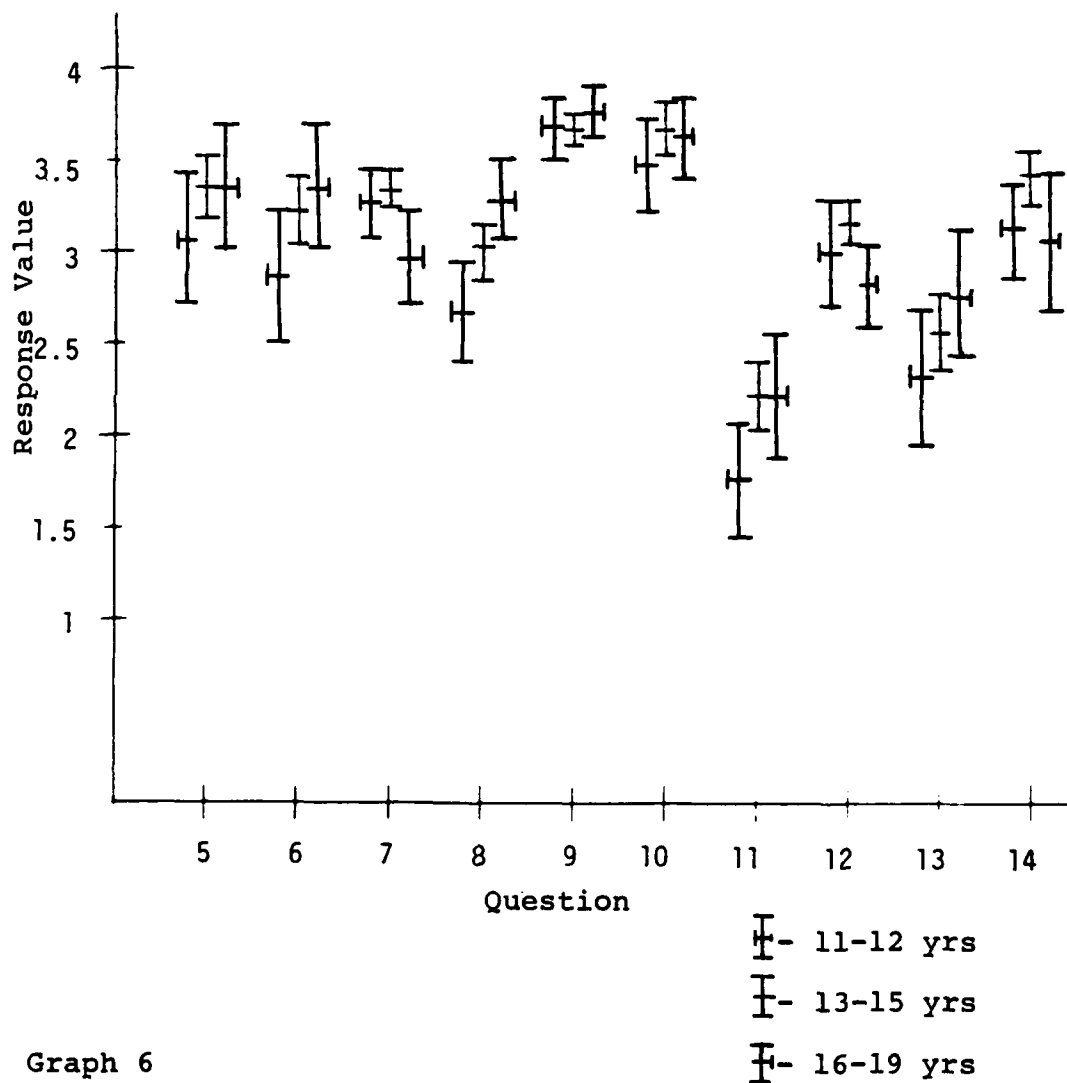
in satisfaction with the general appearance of the teeth, a significant increase in the smile appearance, and significance in comparison with classmates' teeth with the 13-15 year old group. There was a significant increase in friends with braces in the 13-15 year old group and a significant drop in the 11-12 year old group. Both the 13-15 and the 16-19 year old groups showed a significant rise in recommending braces and all three groups shared a significant rise in their enthusiasm for orthodontic treatment. There was a slight drop in happiness level in all groups. Whether this was of dental origin or not was indeterminate. As enthusiasm for treatment increased significantly, it was doubted that the decreased happiness level was dentally related.

Female subjects in active orthodontic treatment were compared (Graph 6) on the basis of the same three age groups as their male counterparts: 1) 11-12 year old (25 subjects with a mean age of 11.52 years and a mean treatment time of 8.52 months), 2) 13-15 years old (70 patients with a mean age of 13.82 years and a mean treatment time of 18.22 months), and 3) 16-19 years old (27 subjects with a mean age of 16.40 years and a mean treatment time of 27.22 months). Again, it was noted that with an increase of age, there was an increase in the mean

TREATMENT

FEMALES

11-12, 13-15, 16-19 Years Old



treatment time so that the trends and differences found were based on the variables of age and treatment time.

The one major area of significance in comparing the three groups was with respect to the comparison of the subject's dentition with that of their classmates. With an increase in age (and treatment time) there was also an increase in feeling that one's teeth were better than average or among the nicest. This trend was followed with respect to satisfaction with general appearance of teeth, appearance of smile, happiness, compliments on teeth and recommendation of braces to friends. Like their male counterparts, there was a drop in self-satisfaction with general appearance and the expected rise in the 13-15 year old group who had friends with braces followed by the drop in the 16-19 year old group. The 11-12 year olds felt the most teasing and less compliments with the latter being the stronger trend between the two. Enthusiasm for orthodontic treatment peaked with the 13-15 year olds and dropped to its lowest point for the 16-19 year olds.

Comparing the treated female group to the three age groups of the control it was noted that there were significant differences, with an increase in self-satisfaction, across the board. There were significant increases in satisfaction with general appearance of the

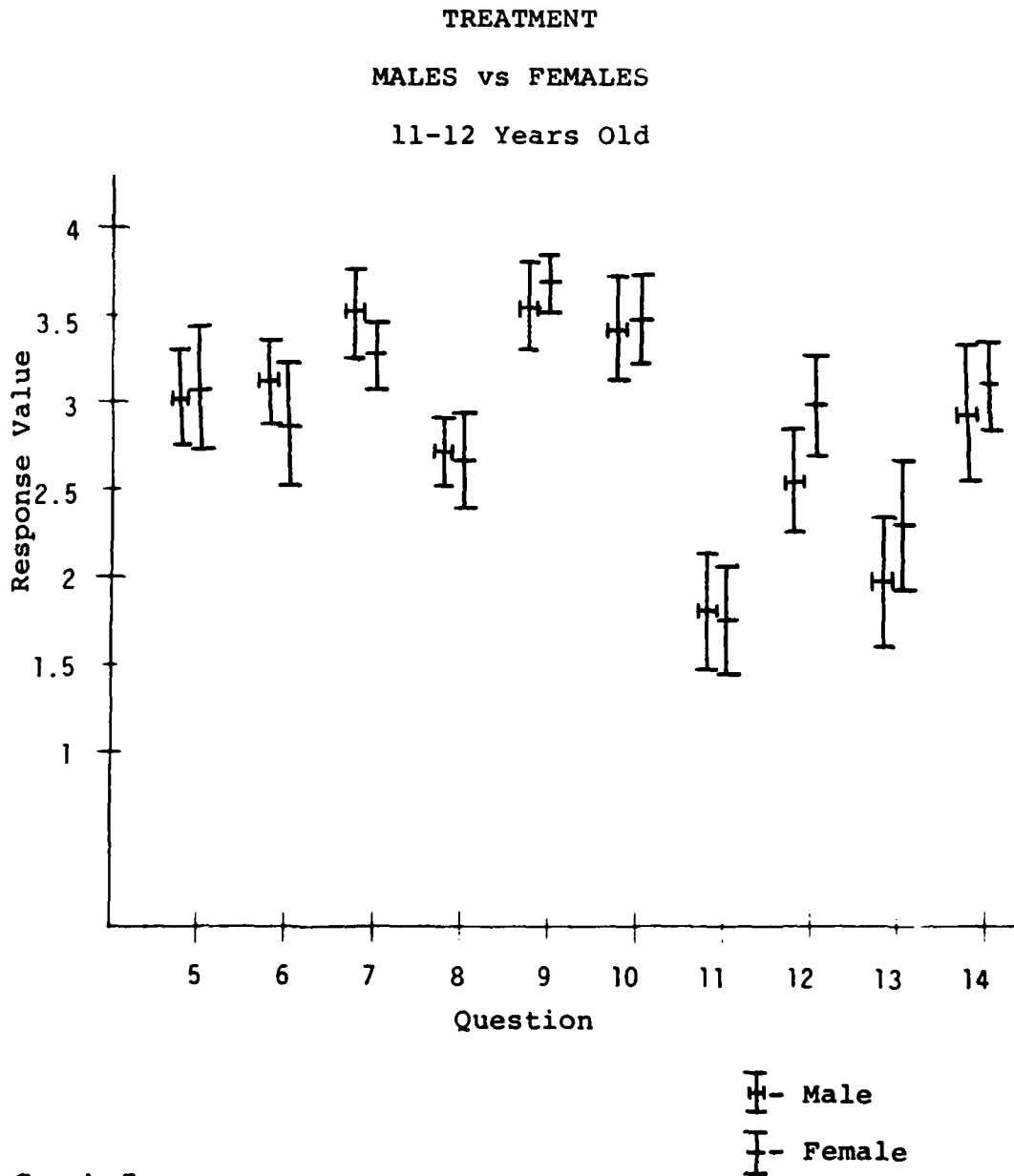
[teeth, classmate comparisons, compliments on teeth and friends with braces (in the 13-15 and 16-19 year old ranges), recommendation of braces to friends and happiness with having orthodontic treatment.

A comparison of active 11-12 year old patients according to sex was performed (Graph 7). Twenty-five females with a mean age of 11.52 years and a mean treatment time of 8.52 months were compared to 23 males with a mean age of 11.43 years and a mean treatment time of 6.82 months.

Both groups were approximately the same in response to general appearance of teeth but the males were more satisfied with smile appearance, general appearance, and in comparison to their classmates. It was suggested that females at this age might be more aware of self-image and thus view themselves from a more critical standpoint.

Males had a lower denial rate of teasing than the females and were relatively equal in regard to compliments. Although the teasing factor was of minor difference, it might follow, as previously noted, that the boys were more verbal in their social teasing.

There was a stronger difference in the amount of females that had friends with braces. Assuming that they [were females friends, this might be explained by the



Graph 7

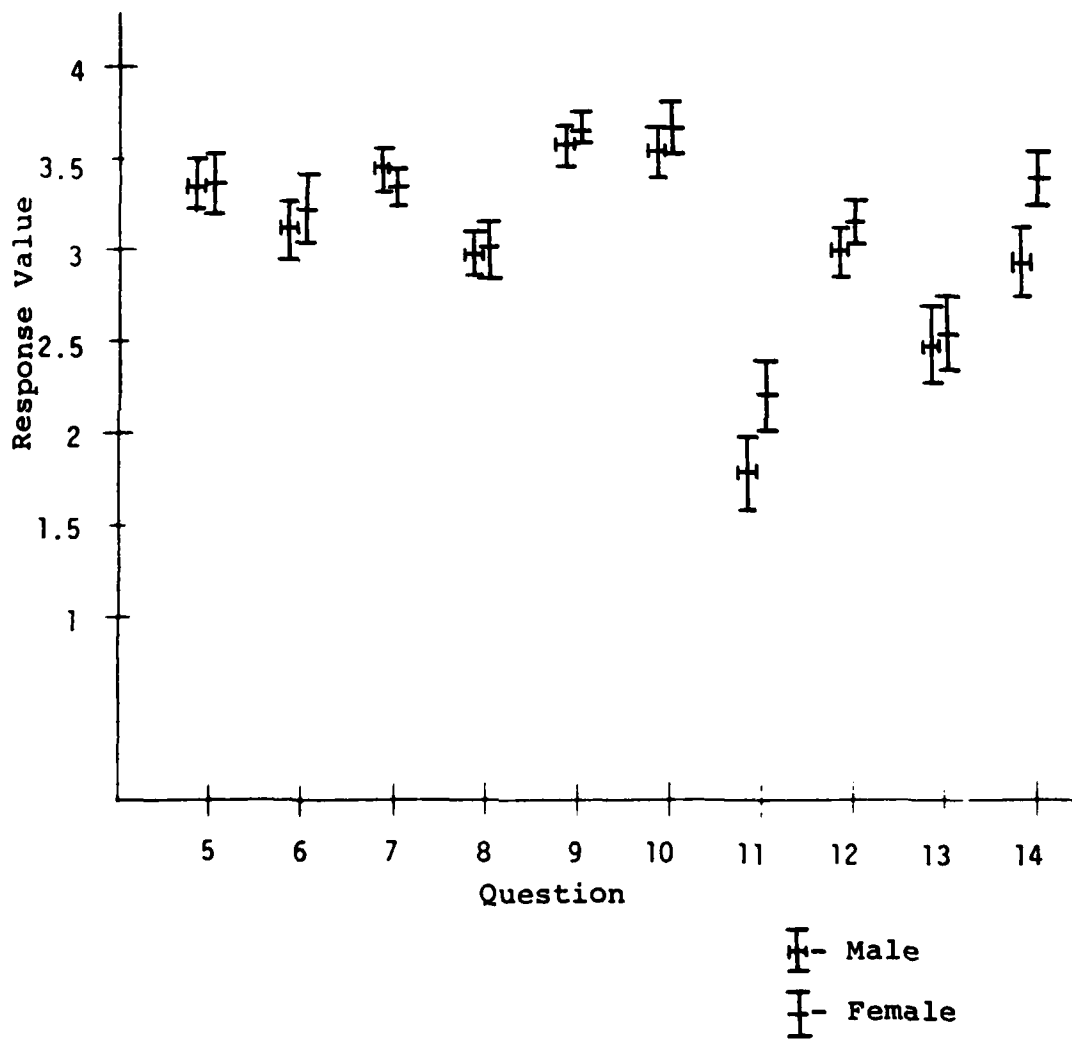
relatively earlier treatment of girls vs. boys with respect to maturation. Therefore, there might be a larger population of female orthodontic patients. It also cannot be discounted from the data that females may have either gravitated toward friends similarly treated or that they were more aware of friends wearing appliances.

Females also rated higher in regard to the recommendation of braces to friends and in a positive way to being treated orthodontically. Whether females were more mature at this age and realized the significance of treatment or that males at this age were less inclined toward treatment was open to conjecture.

In summary, with this comparison of the 11-12 year olds, there were no significant differences between the sexes. The largest difference in response was found in the answers to questions concerning the amount of friends with braces and the recommendation of treatment for friends in which females displayed a strongly higher response.

The next treatment group, 13-15 year old males and females undergoing active orthodontic treatment, were compared (Graph 8). The 76 subject male population mean age was 14 years old with a 16.39 month mean time in treatment. The 70 female subjects averaged 13.82 years of age and a mean time in treatment of 18.22 months. Because

TREATMENT
MALES vs FEMALES
13-15 Years Old



Graph 8

of the larger number of subjects, the range of values narrowed for the .10 level of confidence employed. While some differences appeared only slight, there was change noted in comparison to the previous 11-12 year old groups and two areas of significance in regard to compliments and happiness with treatment.

Although very slight, the trend of females rating higher than males in regard to appearance of teeth and overall general appearance remained the same. There was a shift toward the females rating a higher self-satisfaction with appearance of smile and comparison to classmates' dentition. Females rated higher in happiness and in lack of teasing due to dentition.

There was a strongly significant shift on the question of compliments by classmates. Females (2.22) rated compliments on their teeth higher than males (1.81). These females also had a higher amount of friends with braces, tended to recommend braces to friends, and had a significantly higher response to satisfaction with having received orthodontic treatment (3.41 vs. 2.97). The latter three questions all followed the basic trends of the 11-12 year olds.

Compared to the control group of 13-15 year olds, there were significant differences in general appearance of

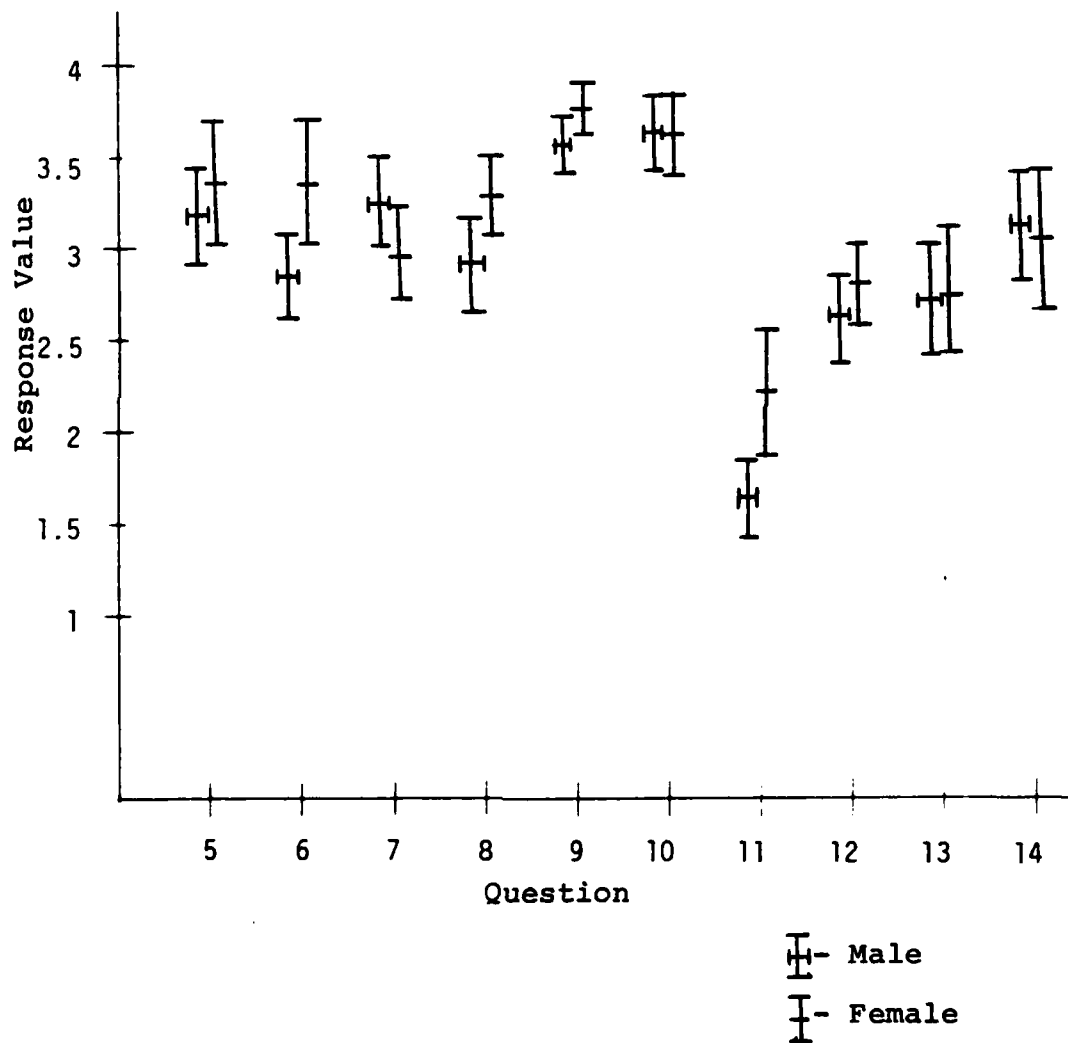
teeth, appearance of smile, satisfaction with general appearance, comparison to classmates, compliments on teeth, friends with braces, the recommendation of treatment and happiness with treatment. There was slightly less teasing in the control group and a slightly lower level in the happiness level in the treatment group. Neither set of differences were significant.

The next comparison was done between the 16-19 year old group (Graph 9). The male group consisted of 29 subjects with a mean age of 16.55 years and a mean time in treatment of 24.86 months. The female group consisted of 27 individuals with a mean age of 16.40 years and a mean time in treatment of 27.22 months.

The trends shown by the 13-15 year old group were almost mirror-imaged by the 16-19 year olds across the board. The only difference was in the amounts of change in certain responses and less significance between those differences attributed to gender.

There was a higher satisfaction with general appearance of teeth and a strongly higher satisfaction with smile among the females. The higher response among females held with classmate comparison and happiness level. Males continued to have a higher response satisfaction with general appearance.

TREATMENT
MALES vs FEMALES
16-19 Years Old



Graph 9

Both groups were almost identical in the amount of teasing noticed but the females were significantly higher in response to the amount of compliments received (2.22 vs. 1.65). The female response was also higher in regard to friends with braces and in recommendation of braces to friends.

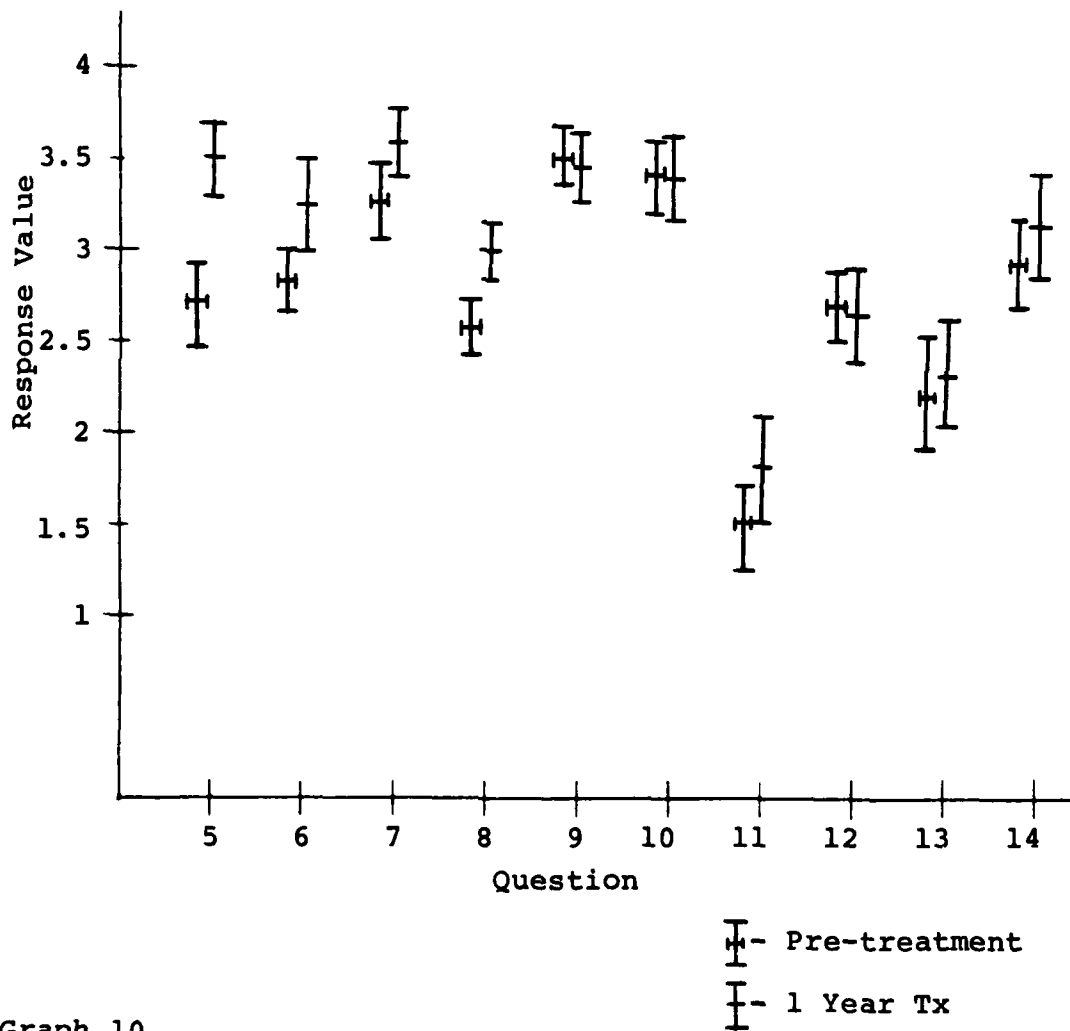
Interestingly enough, the last question was the only change in response between the groups. The 16-19 year old males had a higher response than their female counterparts concerning happiness with having braces. This was a reversal with girls responding higher than boys in the 13-15 year old group. This change was a net result of the males responding higher in the older group and the females responding at a lower level than the 13-15 year old females. This change in response may be attributable to the self-consciousness of the females at this socially conscious age bracket.

A comparison of males was performed using pretreatment versus treatment as the variables (Graph 10). Thirty-seven pre-treatment males with a mean age of 12.94 years were compared with 32 males in the less than 1 year treatment group with a mean age of 13.31 years and a mean treatment time of 8.18 months. There were several areas of significant difference in response to questions.

TREATMENT

MALES

Pre-Treatment vs 1 Year Treatment Time



Graph 10

The treated males responded at significantly higher levels than the pre-treated males in regard to satisfaction with the general appearance of their teeth (3.50 vs. 2.72) and smiles (3.25 vs. 2.86). The positive change in self-image and satisfaction may be attributed to the probable change in alignment of the teeth that occurred with the treatment group through the wear of orthodontic appliances. The positive response continued with satisfaction with subject's general appearance and was again significant in regard to comparisons with classmates' dentitions (3.00 vs. 2.59). All four measures of self-image and self-satisfaction rose with the commencement of orthodontic treatment.

Happiness levels and teasing response differences were negligible. But the positive response to compliments rose with the treatment group, although not a highly significant amount.

There was a negligible change in the response to the amount of friends with braces and only a slightly more positive response to recommending treatment to friends. There was a larger positive response to satisfaction with receiving treatment although the responses between the two groups had slightly different meanings. The pretreatment group would like to have braces while the treated group was

glad to receive the treatment. Even so, a higher positive response to treatment was displayed.

In summary, the main importance of this comparison was the positive effect that the first year of treatment had upon the individual's self-image and self-satisfaction. All four self-image questions were responded to at a higher positive level, with three questions showing a significant change and the fourth a strong tendency toward significance.

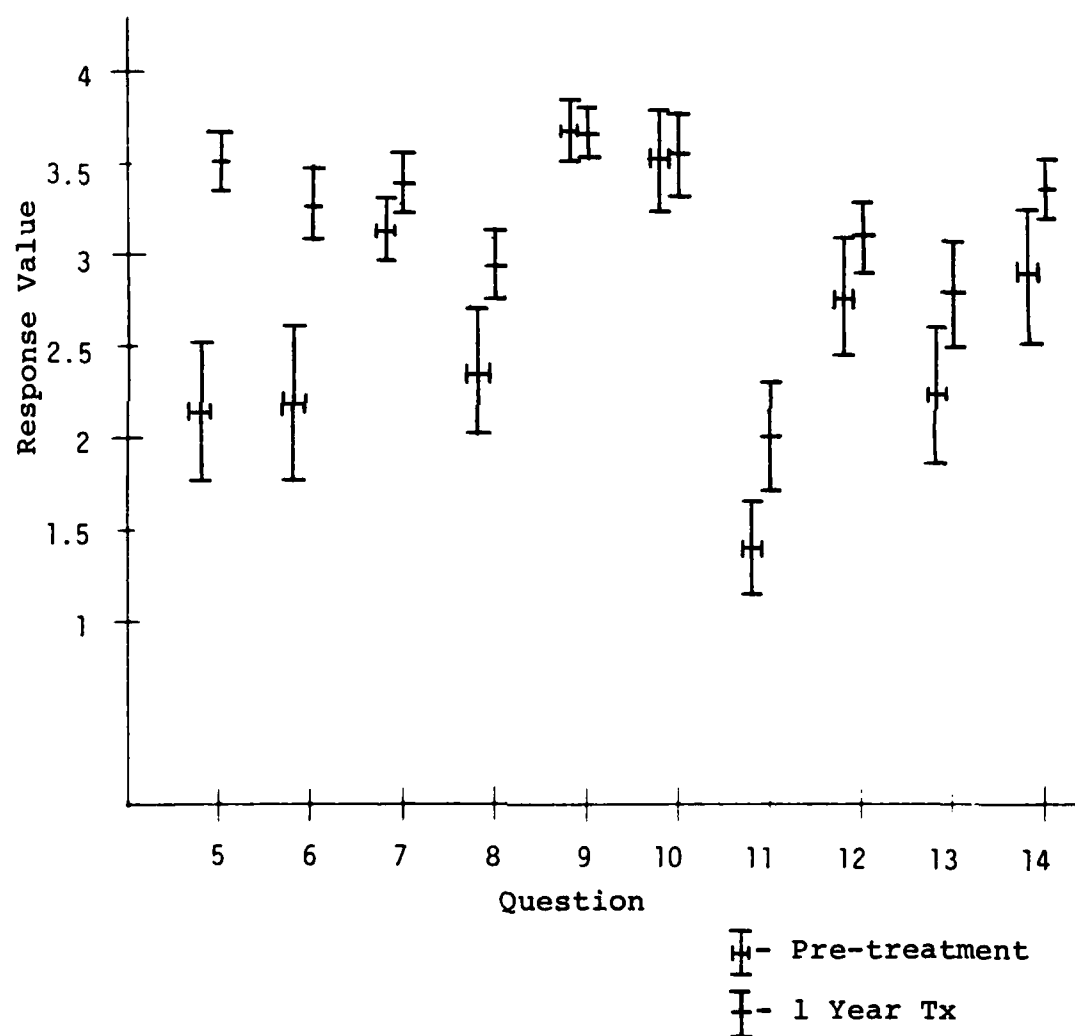
Twenty-four pretreatment females with a mean age of 13.12 years were compared with thirty-three females with a mean age of 13.18 years and a mean time in treatment of 9.18 months (Graph 11). The latter group represented those females that had been treated orthodontically for one year or less. The differences in responses were highly significant in self-image questions and strongly apparent in other questions.

In response to satisfaction with the general appearance of teeth, the treatment group showed a highly significant response level of 3.54 compared to the pretreatment group response of 2.16. Satisfaction with smile rose significantly from 2.20 in the pretreatment group to 3.30 in the treatment group. While not a significant difference, the treatment females ranked their general

TREATMENT

FEMALES

Pre-Treatment vs 1 Year Treatment Time



Graph 11

[appearance higher than the pretreatment females. The next area of significance was in response to the comparisons with classmates' dentitions. The treatment group was more positive (2.96) than the pretreatment group (2.37). These responses paralleled the responses of their male counterparts but larger disparities were noted.

There was negligible difference in happiness levels between the two groups and the denial of teasing was equally high among the groups. There was a significant difference in the amount of compliments perceived. The treatment females responded higher (2.03) than the pretreatment females (1.41) in their reception of compliments.

The next three questions showed strong differences between the two groups, although not quite significant in themselves. Treated females were more positive in the amount of friends with braces, in the recommendation of braces to friends and in the satisfaction of having received treatment. Again, these paralleled their male counterparts but showed stronger disparity between the pretreatment and treatment groups.

These results were in agreement with the results obtained by Dorsey and Korabik.(53) They also found a [significant increase in self-image at the 7 month treatment]

period. There was some disagreement noted in that they saw no age or sex differences in their study.

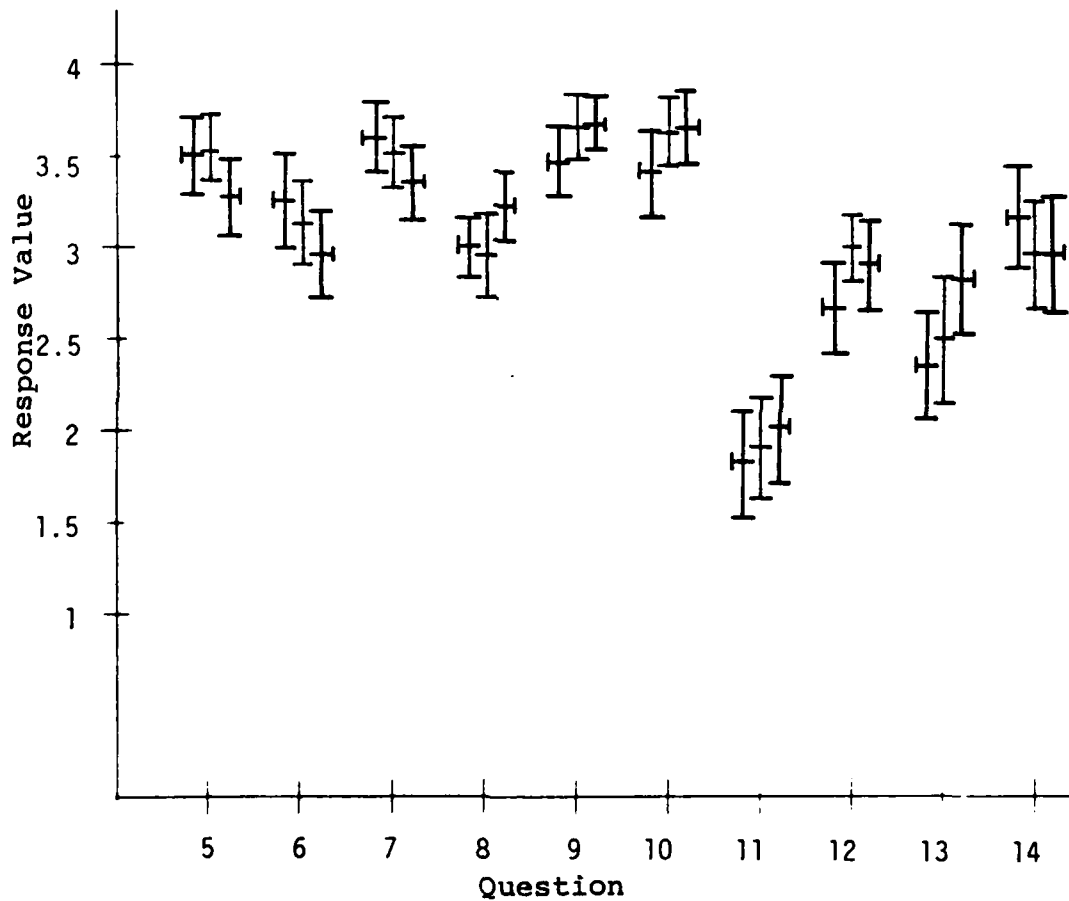
Treated males were compared according to time in treatment (Graph 12). The subjects were divided into three groups: 1) males with one year or less in active treatment (32 subjects with a mean treatment time of 8.18 months and a mean age of 13.31 years), 2) males with more than 1 year and 2 years or less of treatment (34 subjects with a mean treatment time of 20.52 months and a mean age of 14.41 years), and 3) males with more than 2 years of treatment and limited to 5 years (31 subjects with a mean treatment time of 38.93 months and a mean age of 15.51 years). Although an increase in age was seen with an increase in treatment time, the difference in mean was only 2.20 years.

There was a definite drop in self-satisfaction with the increase in treatment time. A lower self-satisfaction was recorded with regard to general appearance of the subject. This drop may have been due to a closer scrutiny of body-image, an increased awareness of the appliances, or may have been due to the fact that rapid dental changes were not apparent after the first year and a comparison was no longer being made on what the patient originally looked like. When compared to classmates though, there was a

TREATMENT

MALES

1. 1-2, 2-5 Years Treatment Time



┌- 1 year
┌- 1-2 years
┌- 2-5 years

Graph 12

[rise in satisfaction with the increased time in treatment in the treatment group of 2-5 years.]

Happiness levels, lack of teasing, and amounts of compliments increased with the increase in treatment time. It had been suggested by Maj(34) that initial orthodontic treatment may place an increased amount of stress on the patient. With time, this stress is adapted to. This may help to explain some of the results obtained in the increase of the happiness levels with the increase in treatment time.

There was an increase in response to friends with braces with the increase in treatment time peaking in the 1-2 year group and tailing slightly in the 2-5 year group. This may have been a function of not only treatment time but of the age of the subject with an increase from 13 to 14 and a slight tailing off from 14 to 15 years of age.

There was also a definite trend toward the recommendation of braces with increased treatment time. Seemingly in contrast to this is the fact that happiness with treatment dropped after the first year of treatment and then remained level in the following year. This trend followed the pattern that was shown with the comparisons of increased age.

[

The comparison of treated females according to time in treatment (Graph 13) differed from the males. The subjects were again divided into three groups: 1) females with less than 1 year in active treatment (33 subjects with a mean treatment time of 9.18 months and a mean age of 13.18 years), 2) females with more than 1 year and 2 years or less of active treatment (32 subjects with a mean treatment time of 19.75 months and a mean age of 14.18 years), and 3) females with more than 2 years of active treatment with a limit of 5 years (36 subjects with a mean time in treatment of 36.33 months and a mean age of 15.02 years). As in the male group, there was an increase of mean age (2.84 years) with the increase in treatment time.

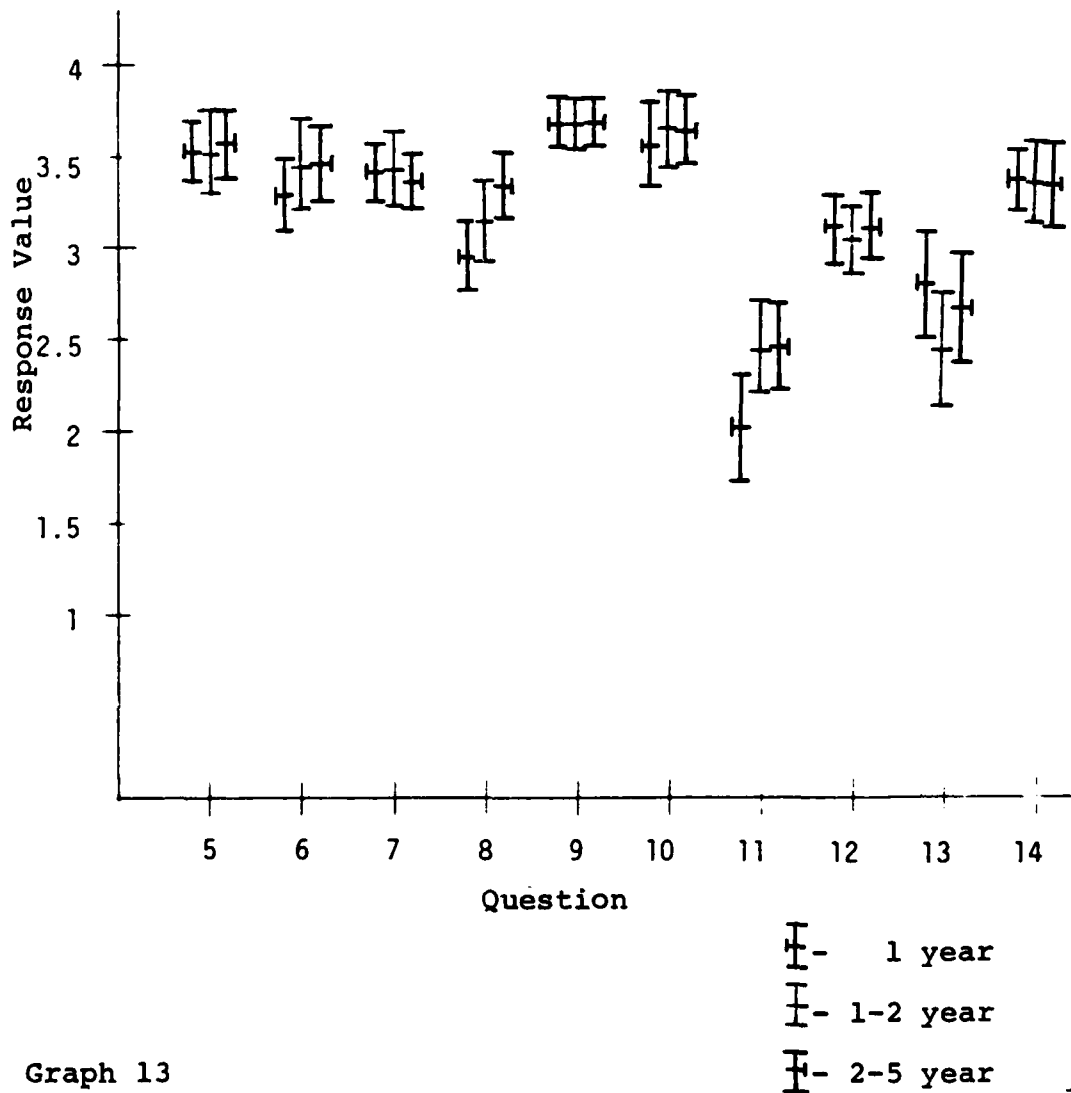
In respect to satisfaction with general appearance of teeth, appearance of smile, and overall general appearance, there was little difference between the groups. The under one year treatment group was less satisfied with their smiles compared to the other groups, but not significantly so.

There was a significant difference when classmate comparisons were recorded. Ratings over classmates increased in direct response to time in treatment (2.96 vs. 3.15 vs. 3.36). This was to be expected, as hopefully, there would be an improvement in facial esthetics as time

TREATMENT

FEMALES

1, 1-2, 2-5 Years Treatment Time



in treatment progressed.

Happiness levels were constant throughout the three groups as was the level of teasing, although the under one year treatment group was more prone to teasing. Possible explanations for this might be teasing directed at the original malocclusion, a self-consciousness about the appliance and/or more teasing done at the younger age groups. This was open to conjecture as there was no significant difference between the groups.

As the decrease in teasing occurred, there was a significant increase in the response to compliments with the increased time in treatment. The greatest change was from the under one year group (2.03) to the 1-2 year group (2.46). The 2-5 year group (2.47) maintained the same level as the 1-2 year group. With the changes that can occur in the first year of treatment, it was not surprising to have compliments increase.

The amount of friends with appliances did not change significantly nor was there any strong pattern suggesting a difference. A change was not expected as the mean ages were between 13 and 15 years of age and most females would be in treatment at this time.

There was a difference in the recommendation of treatment to friends. With the under one year group at the

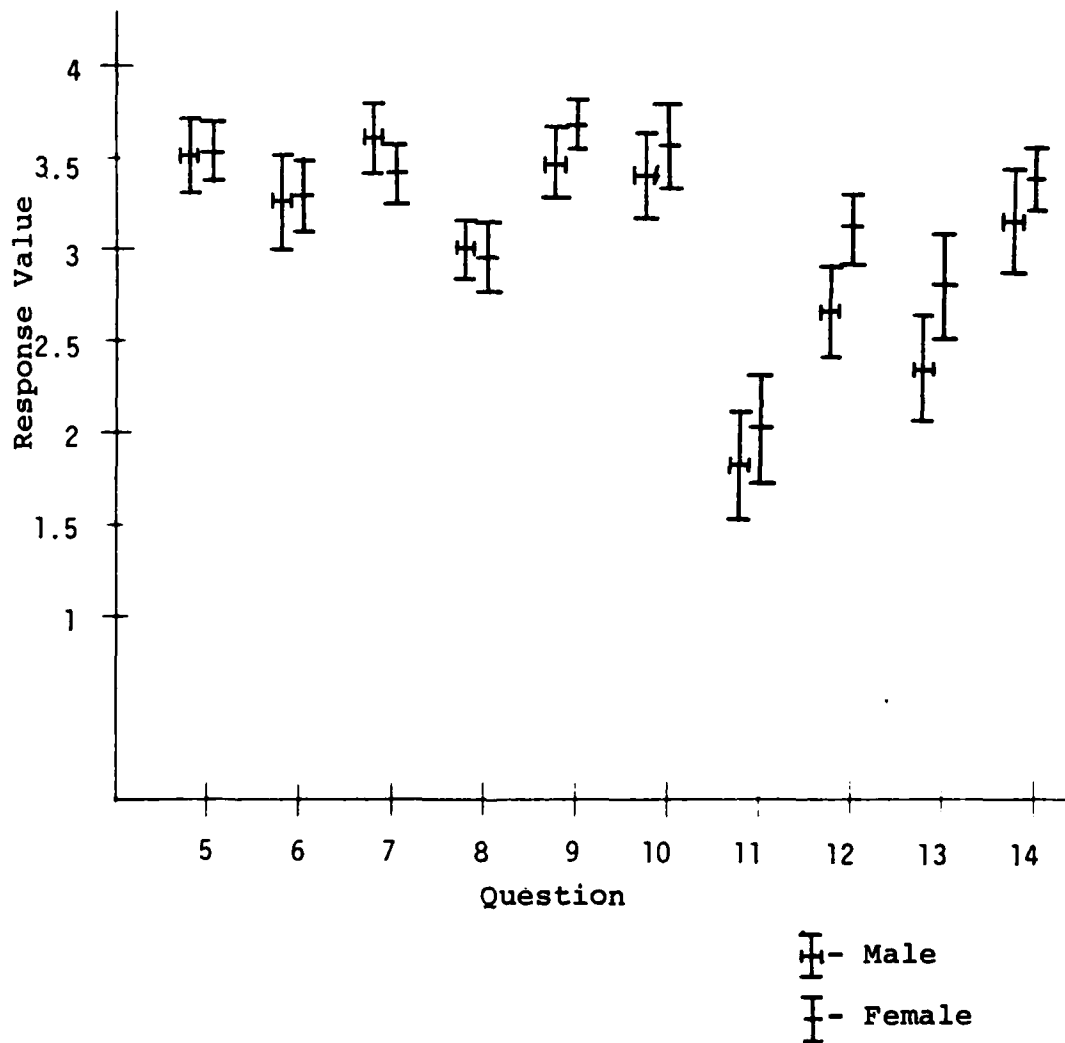
peak, there was a strong drop with the 1-2 year group and a rebound to a higher response with the 2-5 year group. This differed with the males whose recommendations increased with treatment time.

Although there was a variation in recommending treatment, all three groups remained equally satisfied with having braces. In fact, there was a negligible difference from the start of treatment to the end. In the males, there was an initial peak followed by a tapering off at the 1-2 year mark. This level held steady through the 2-5 year group. It appeared that females were equally glad to have braces throughout treatment regardless of treatment time or the increase of age.

A more detailed and specific comparison was made by comparing the time in treatment groups using sex as the variable. Thirty-two males with a mean treatment time of 8.18 months and a mean age of 13.31 years were compared with 33 females with an average treatment time of 9.18 months and a mean age of 13.18 years. These two groups comprised the groups of the under one year treatment category (Graph 14).

There was a negligible difference in response to satisfaction with general appearance of teeth and smile. Both groups were in the mild to very satisfied range. In

TREATMENT
MALES vs FEMALES
1 Year Treatment Time



Graph 14

[the satisfaction of general appearance, females downrated themselves, which followed other sections of this study and was explained by the closer body-image scrutiny of females versus males at this age. There was also a slight downrating regarding comparison with classmates by the females but not to any significant level.

Both groups were very positive in response to happiness and denial to any teasing. Females were more positive in regards to both questions. Likewise, females responded positively to the amount of compliments received.

There was a significant difference between the two groups in response to the amount of friends with braces. The females responded at a higher level which paralleled the responses of females of this age in other comparisons in this study. Again, this higher response might be due to a higher proportion of females in the general population having orthodontic appliances at this particular age group.

There was a strong trend for females to recommend orthodontic treatment to their friends plus they were more positive in their response to receiving orthodontic treatment.

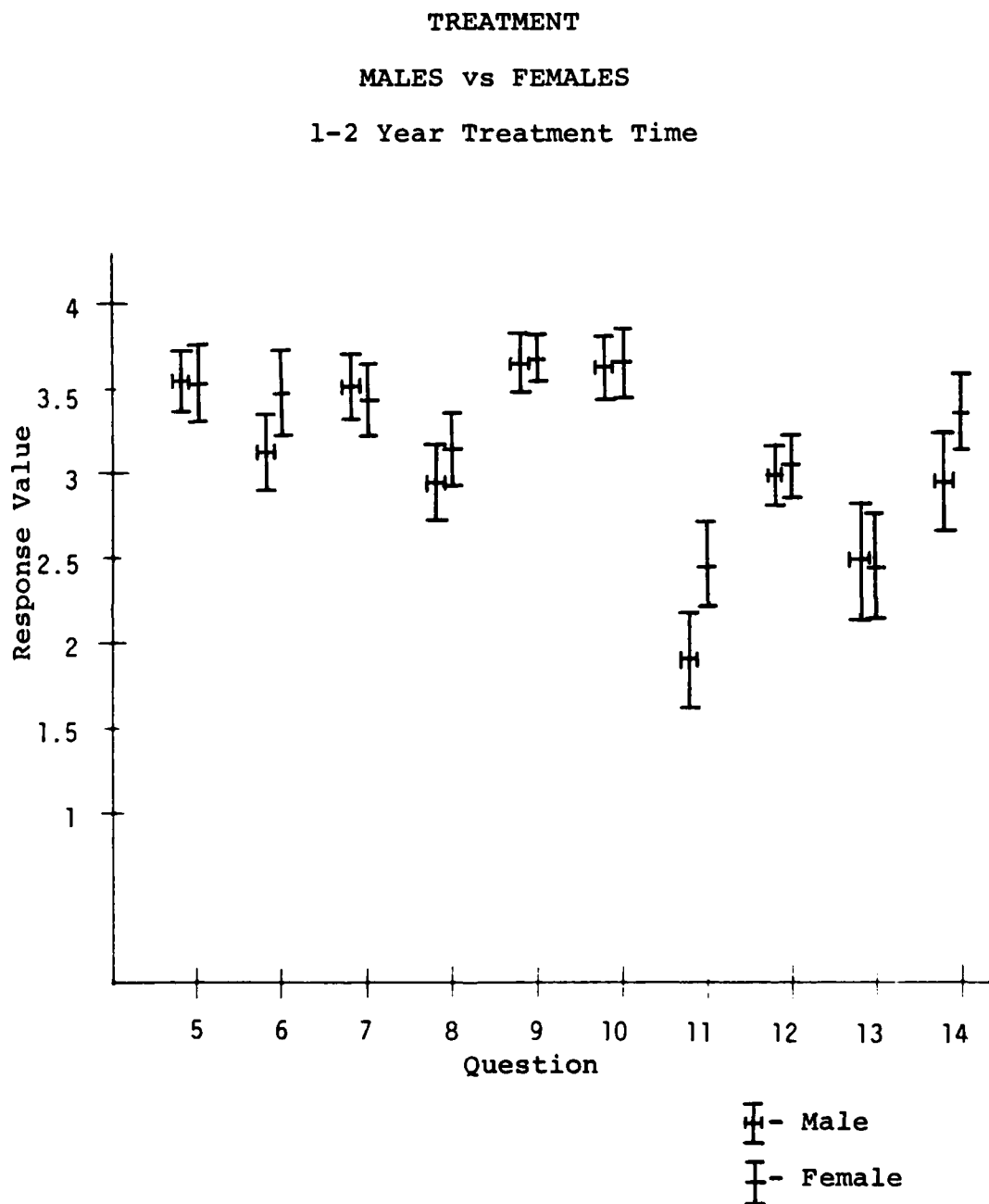
In summary, females treated for less than 1 year tended to be happier, be complimented more, have more friends with braces, recommend treatment more and were happier in

receiving treatment than males of the comparative group.

Males versus females in the 1-2 year treatment group were compared with results displayed in Graph 15. Thirty-four males with a mean treatment time of 20.52 months and an average age of 14.41 years were compared with thirty-two females with a mean treatment time of 19.75 months and a mean age of 14.18 months.

Although there were areas of disparity in responses, the differences were slight to negligible in many questions. Both groups were comparable in response to general appearance of teeth and overall general appearance. There was a difference in smile satisfaction with females having a higher positive response. This was due to an increase by the females and a decreased positive response by the males. Whether the females judged their smiles by looking past the appliances and the males judged theirs as part of the appliances was open to conjecture. There was a difference between the sexes in regard to classmate comparison. Females had a higher positive response, though it was not a significant difference.

Both groups were equally happy and denied being teased because of dental factors. Once again, the females had a significantly higher response to compliments from classmates (2.46 vs. 1.91).



Graph 15

There was little difference in the number of friends with braces. Possibly at the 14 year old mark there was more of an even sex distribution in the population as the amount of male responses increased while the females maintained a constant number. On the other hand, perhaps males at this age were more observant.

In the recommendation of treatment, there was negligible difference between the two groups. This was due, not so much because of an increase in recommendation by males, but because of a decrease in the response by females. This contrasted the results obtained when age was used as a variable.

The difference between happiness with treatment increased as the female group remained constant while the male group decreased. This was not only true for this group but also for the 13-15 year old group and the control groups as well. This higher response by the females regarding satisfaction with treatment was almost to the point of significance.

Thirty-one males with a mean treatment time of 38.93 months and a mean age of 15.51 years were compared with thirty-six females with a mean treatment time of 36.33 months and a mean age of 15.02 years (Graph 16). There was more disparity in general question response between the

sexes compared to the 1-2 year treatment group. There was a difference between satisfaction with general appearance of teeth and smile satisfaction as males response dropped and females response remained constant. This difference was strong with respect to appearance of teeth and significant with respect to smile. The variable of age may have been a factor as there was a drop in satisfaction with teeth and smile for males for this later male age group.

With respect to overall general appearance, there was a drop in male esteem which made the comparative responses equal. Females still rated their classmate comparisons higher but there was an increased response by the males that made the differences negligible.

Both happiness and denial of teasing responses were the same and showed negligible variation from the previous 1-2 year treatment group. The amount of compliments again displayed a strong, almost significant, difference. Females, once again, responded at a higher level than males.

There was more disparity between the sexes in regard to the questions pertaining to friends with braces and recommendation of treatment, though neither was significant. Females scored higher, due to a drop by the males, on the amount of friends with braces. Although both

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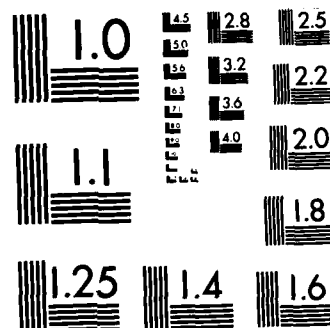
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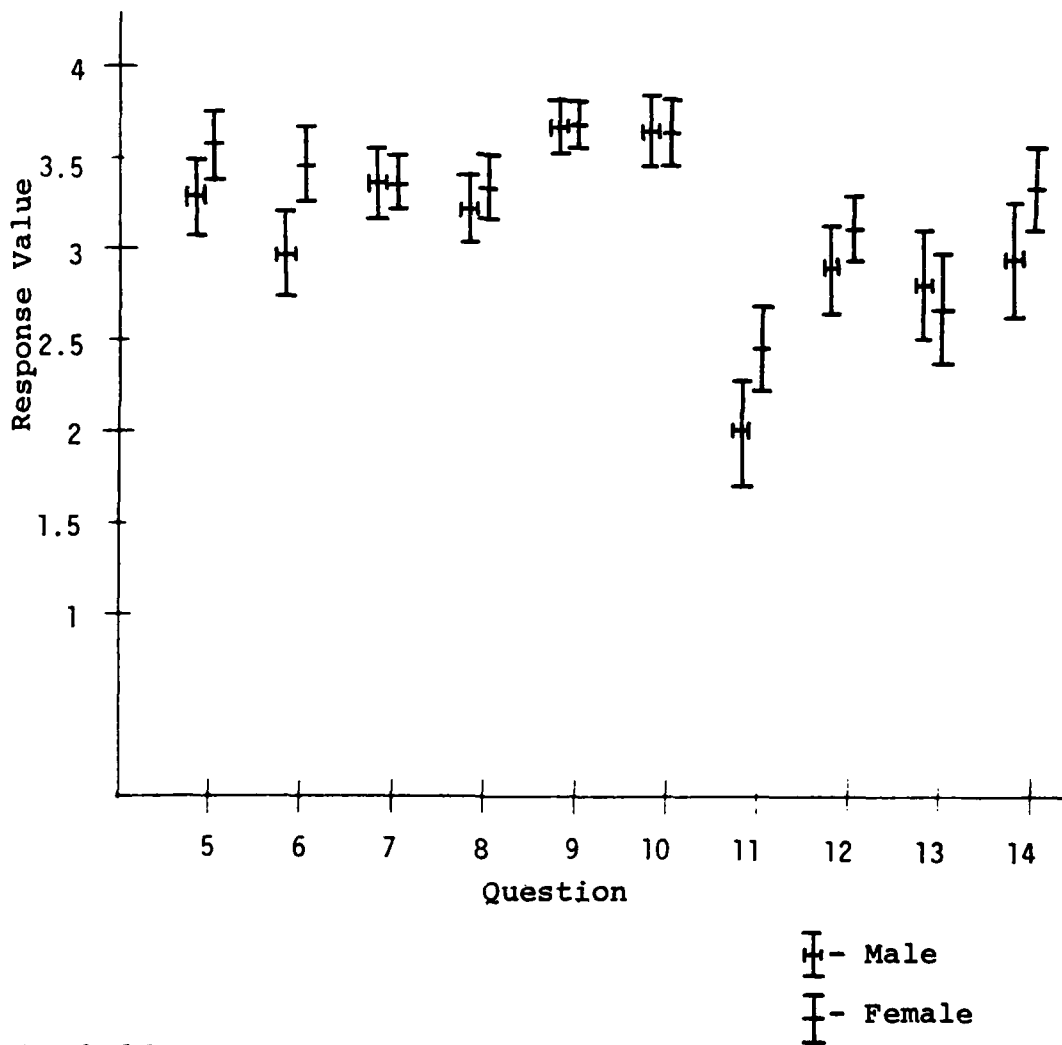
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TREATMENT
MALES vs FEMALES
2-5 Year Treatment Time



Graph 16

groups showed an increase in the recommendation of treatment, males increased to a greater degree and were at a higher response level than the females.

In response to satisfaction with treatment, females were again at a higher level than the males with no appreciable difference when compared to the 1-2 year treatment group.

In summary, there was little major difference between the 1-2 and 2-5 year treatment groups. Both groups showed a significant difference in regard to females being more satisfied with their smiles and in receiving compliments when compared to their male counterparts.

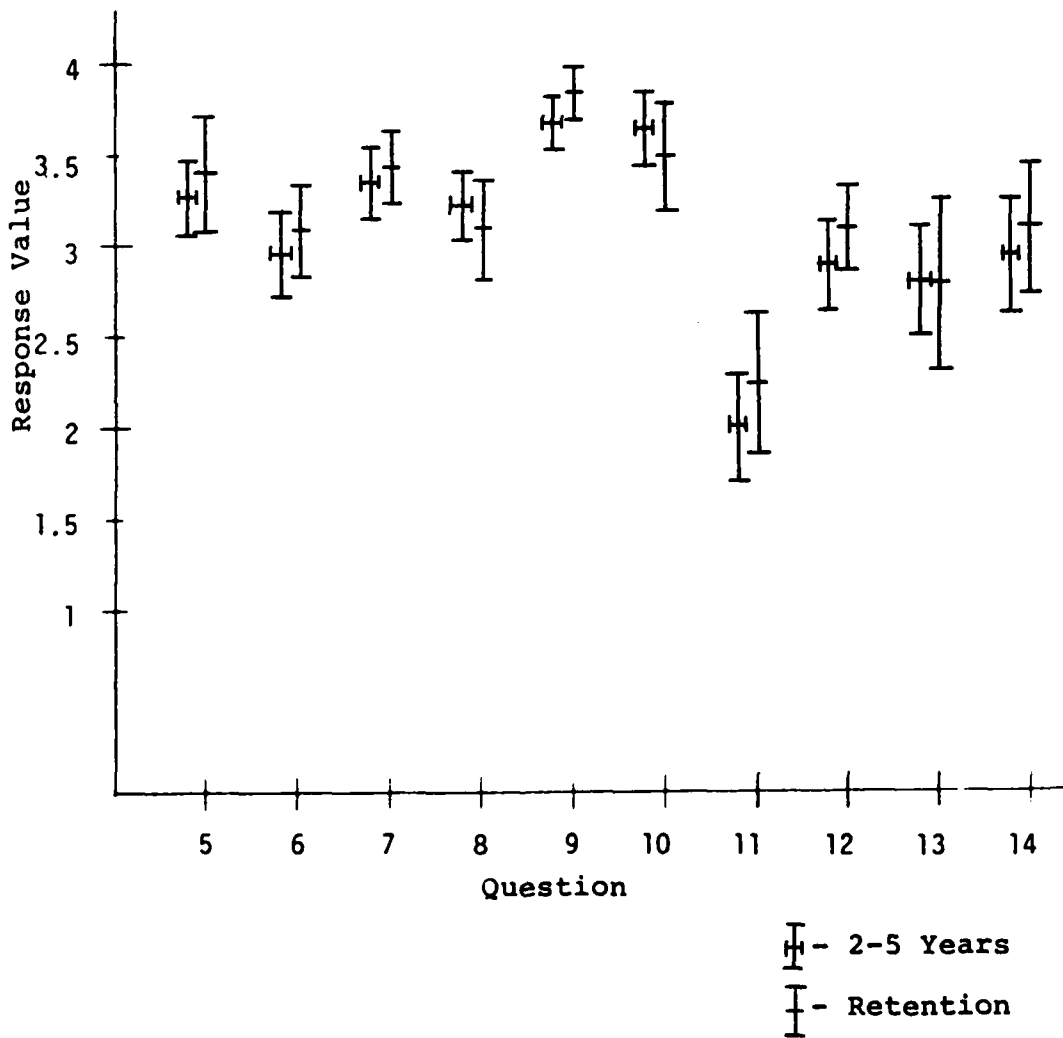
Males in the 2-5 year treatment group were compared to the males in the retention group (Graph 17). There were 31 males in the treatment group with a mean age of 15.51 years and a mean time in treatment of 38.93 months. The 20 males in the retention group had a mean age of 14.40 years, a mean treatment time of 24.90 months, and a mean retention time of 9.95 months.

Although there were no significant difference in the self-image questions, there was a trend toward higher responses made by the retention group. Satisfaction with teeth, smile and general overall appearance was higher for the retention group with a slightly more negative response

TREATMENT

MALES

2-5 Years Treatment Time vs Retention



Graph 17

to classmate comparison.

The retention group responded on a higher happiness level and a lower level to the teasing aspect. Perhaps this was due to a new self-consciousness concerning the appliance removal and retainer wear. At the same time, compliment response rose for the retention group, which should be expected.

The number of friends with braces increased with the retention group. This may have been due to the age variable, as the retention group was almost one year younger in age. This would place them in a prime age for orthodontics, compared with the treatment group which approached the age of 16.

The difference in recommendations for braces was negligible between the two groups. Both groups recommended treatment at the 2.8 level. Both groups were pleased with receiving orthodontics, as the retention group responded slightly higher, but not significantly so.

With the removal of appliances and institution of retainers, there was a trend toward a higher self-image and self-satisfaction but not to any significant degree.

The 36 females in the 2-5 year treatment group with a mean age of 15.02 years and a mean treatment time of 36.33 months were compared with the 26 female retention patients

with a mean age of 14.92 years, a mean treatment time of 28.26 months, and a mean retention time of 11 months (Graph 18).

Although there were no strongly significant differences, there was a trend toward higher responses on most questions by the retention group. Satisfaction with teeth, overall appearance and classmate comparisons were all higher. A relatively strong difference was manifested in response to appearance of smile. The retention group measured 3.76 compared to the 2-5 year treatment group of 3.47.

There was an increase in the happiness level and an increase in the denial of teasing. Paralleling this, there was an increase in the perception of compliments received. There was an increase in the amount of friends with braces and a decrease in the recommendation of braces to friends, although neither was of significant difference.

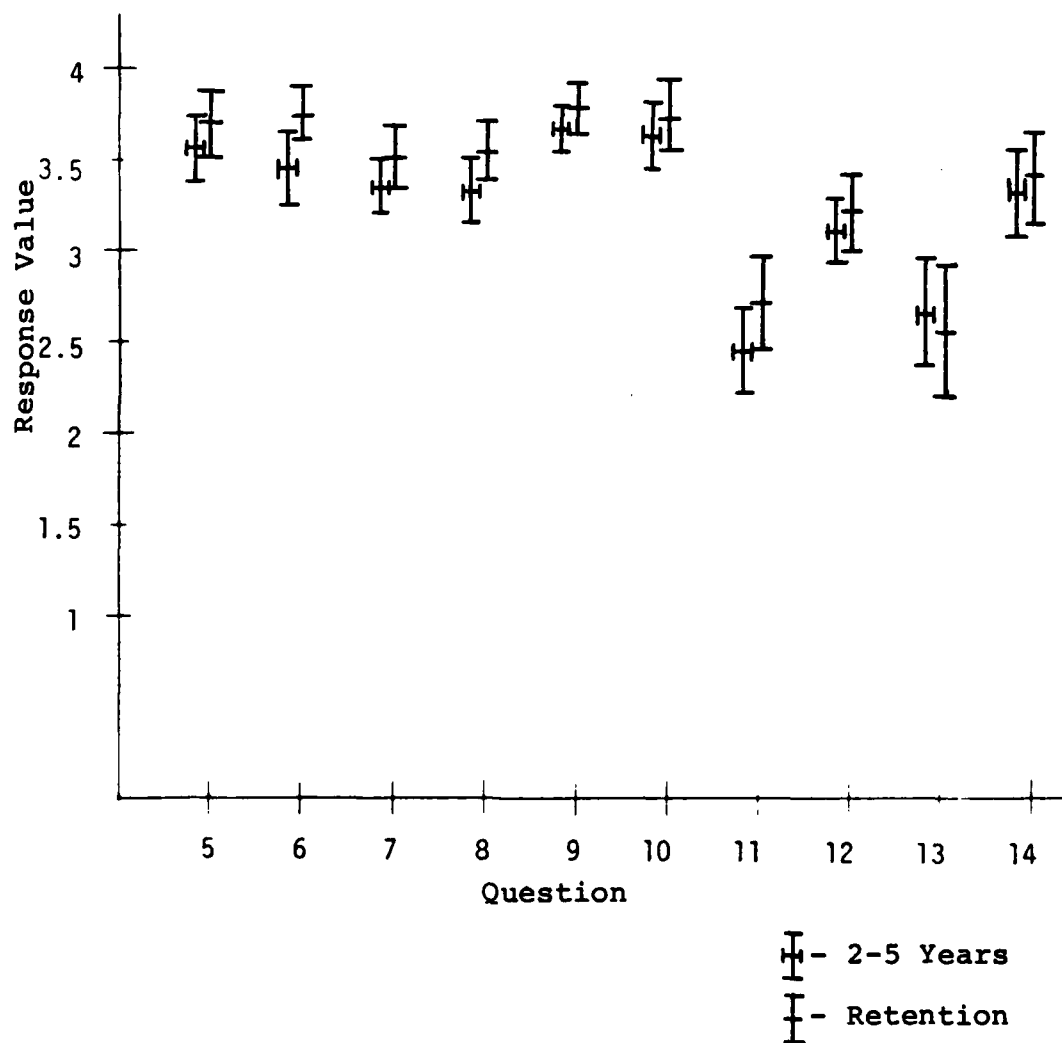
Satisfaction with having had orthodontic treatment rose slightly with the retention group, but again, it was not of a significant difference.

For the females, as with their male counterparts, there was a trend toward a higher self-satisfaction after appliance removal, especially in regard to smile appearance. Retention females were more responsive

TREATMENT

FEMALES

2-5 Years Treatment Time vs Retention



Graph 18

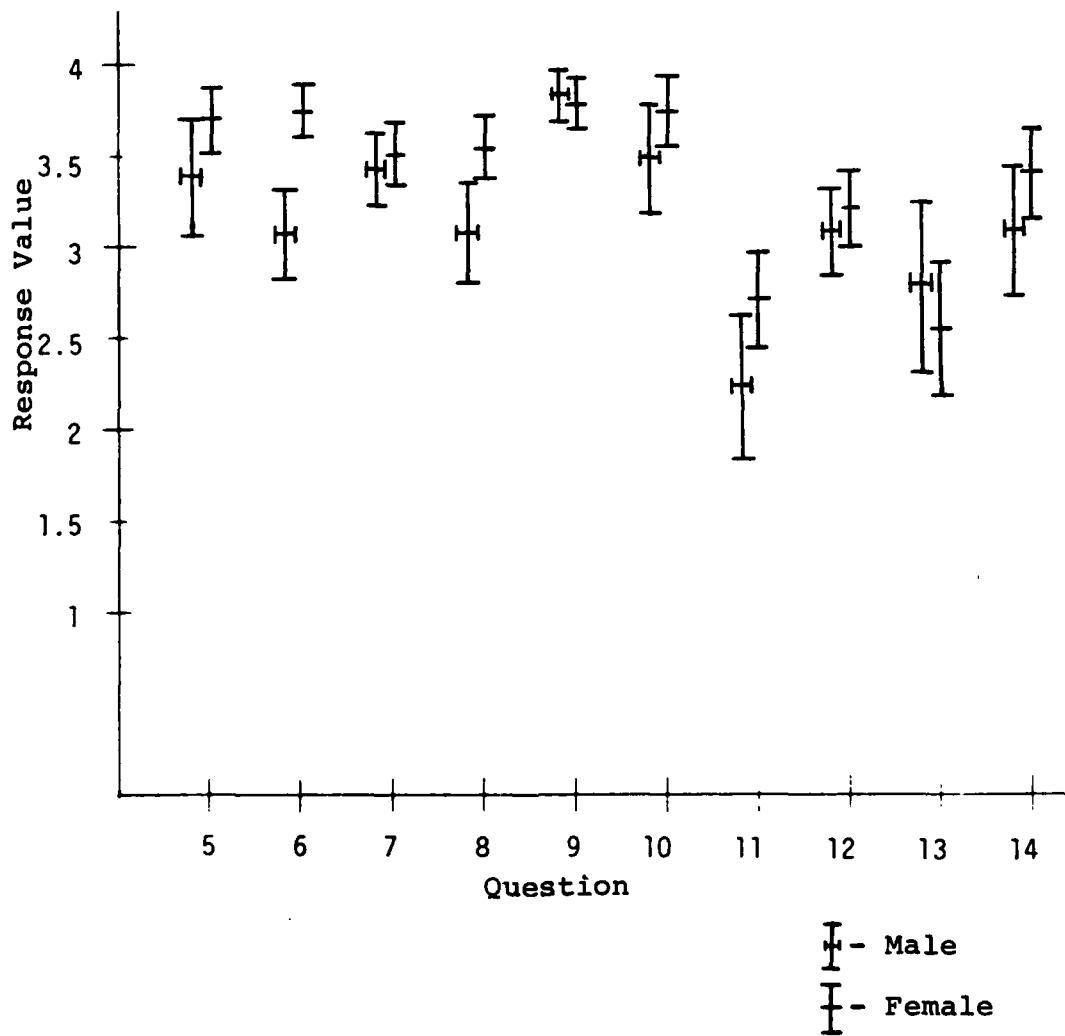
regarding happiness, compliments and satisfaction with treatment.

Male and female retention patients were compared (Graph 19). Twenty males with a mean age of 14.40 years, 24.9 months of active treatment and a mean of 9.85 months retention were compared to twenty-six females with a mean age of 14.92 years, 28.26 months of active treatment and a mean of 11.00 months of retainer wear. There was a large general disparity between responses and several areas of significant difference.

Females were more satisfied with the general appearance of their teeth and significantly more satisfied with the appearance of their smiles (3.76 vs. 3.10). The disjointedness between the two sets was the largest amount between the sexes in all comparisons. This paralleled Graber and Lucker's study(44) that found that females were more conscious of their facial esthetics. There was also a significant difference in the response to comparisons with classmates' dentitions. Females again responded at a much higher level (3.57) than did their male counterparts (3.10).

There was little difference between the sexes in regard to overall appearance and in happiness. Females were slightly higher in overall appearance and slightly lower in

RETENTION
MALES vs FEMALES



Graph 19

happiness but neither set of responses was significant.

Females responded higher in denial to any teasing and conversely, responded much higher, although not quite significantly, to the amount of compliments received. As expected with the removal of appliances, this response was higher for both sexes than the 2-5 year treatment group. Constant throughout the study, the females again had slightly more friends with braces than males.

Females continued the trend of responding more negatively to recommending braces to their friends when compared to males but were happier at having had orthodontic treatment. The recommendation of treatment actually lowered in retention when compared with the 2-5 year treatment groups, but not to any significant difference. The happiness with having had treatment rose in the retention group when compared with the 2-5 year treatment group.

The most significant and most dramatic differences were observed when the pretreatment groups were compared to the retention groups, especially the female groups. Self-image and self-satisfaction rose as did all questions responded to on the questionnaire. Although it can be argued that not all of the responses could be directly attributed to orthodontic treatment, it could be held that treatment

contributed at least indirectly to the changes.

The 37 males of the pretreatment group (mean age 12.94) were compared with the 20 males of the retention group (mean age 14.40 years, mean time in treatment 24.90 months, mean retention time 9.95 months) in Graph 20.

There was a significant rise in the satisfaction of appearance of teeth from 2.72 for the pretreatment males to 3.40 for the retention males. There was also a rise in satisfaction with smile and general appearance but not to as great a difference and not of a significant level. There was a significant change in the comparison with classmates' dentitions from 2.59 in the pretreatment group to 3.10 in the retention group.

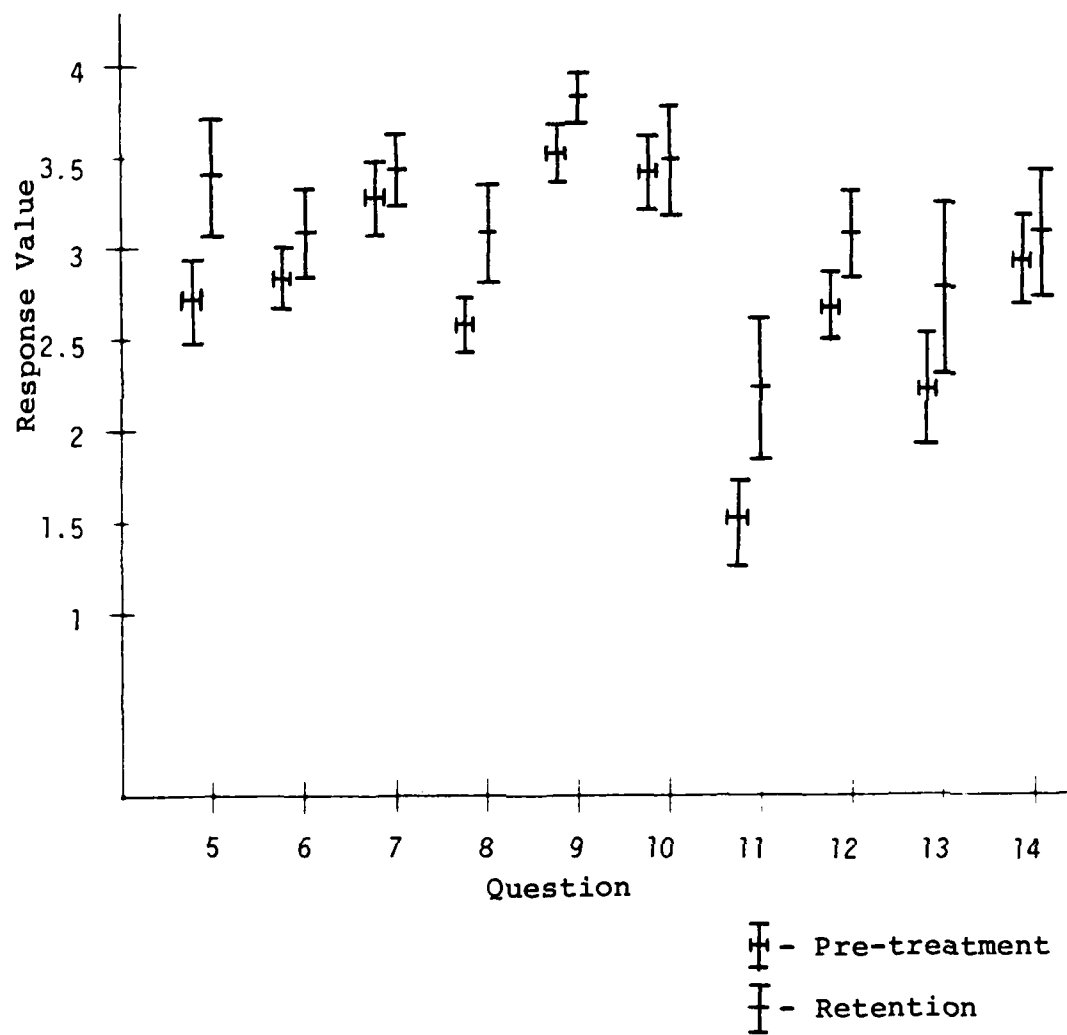
The level of happiness showed a significant rise in the retention group from 3.40 to 3.85. Whether orthodontics was a significant factor in this rise was open to conjecture.

There was a slight rise in the denial of any teasing, which was at a high level to begin with, and there was a significant rise in the perception of compliments from 1.51 to 2.25 for the retention group.

In the response to the amount of friends with braces, there was a significant rise. Although probably a function

PRE-TREATMENT vs RETENTION

MALES



Graph 20

[of age change, the level rose from 2.70 in the pretreatment group to 3.10 in the retention group.

The recommendation of treatment to friends and the happiness with treatment both showed increases although not significant ones.

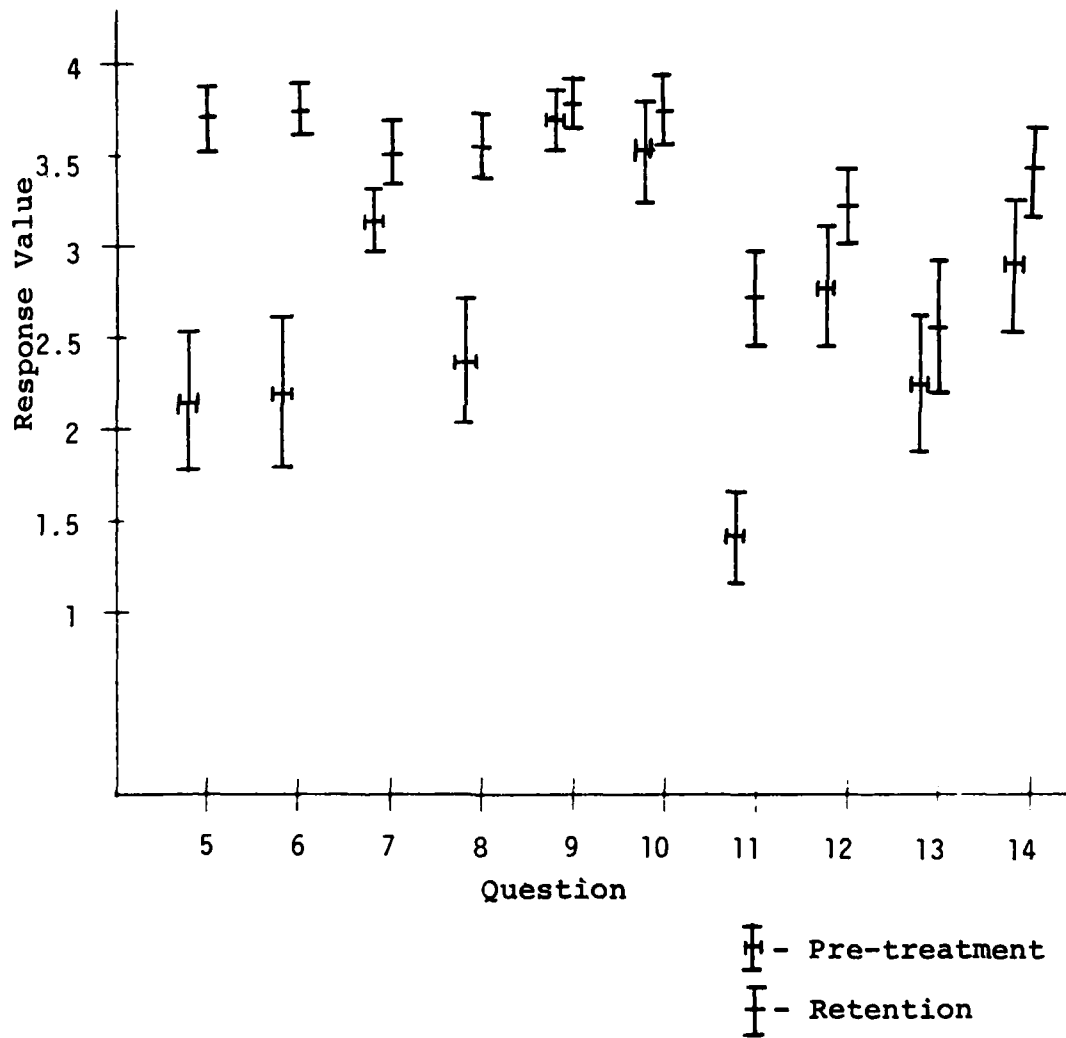
Twenty-four pretreatment females with a mean age of 13.12 years were compared with twenty-six females in retention with a mean age of 14.92 years, a mean time in treatment of 28.26 months and a mean retention time of 11.0 months. This comparison showed the greatest amount of significant difference between sets of all the data compared (Graph 21).

Self-image and self-satisfaction increased significantly in all of the first four responses. Satisfaction with the appearance of the teeth rose significantly from 2.16 in the pretreatment group to 3.73 in the retention group! Satisfaction with smile rose significantly from 2.20 to 3.76. Satisfaction with general appearance rose significantly from 3.16 in the pretreatment group to 3.53 in the retention group. Comparison with classmates' dentitions changed significantly from 2.37 to an increase of 3.57.

There was an increase in happiness level and denial of [teasing. As in their male counterparts, the increase was]

PRE-TREATMENT vs RETENTION

FEMALES



Graph 21

[not significant, as the level was already high. But the] change in perceived compliments was significant increasing from 1.41 in the pretreatment group to 2.73 in the retention group.

Friends with braces increased over the treatment span and, as with the males, was probably a function of age. Recommendation of braces to friends increased, although not significantly. There was a strong change in satisfaction with treatment with an increase from 2.91 to 3.42 in the retention group.

In summary, there was a significant increase in positive self-image, strong increases in happiness, compliments, and recommendation of treatment, and a strong difference in regard to satisfaction with treatment. These changes mirrored the changes in their male counterparts but to a greater degree.

These results were in direct contrast to the results obtained by Klima et al.(54) who found no significant difference in self-image between pretreatment and retention patients. (This study did agree, though, with the assessment that the pretreatment males rated themselves significantly higher than the females in self-satisfaction).

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VI. SUMMARY

There were differences in the findings of this study with findings reported in the literature. In this study, there were significant differences between male and female responses as opposed to the findings reported by Graber(44) and Dorsey and Karabik.(53) There were also significant differences in self-image between pretreatment and retention patients in this study, which was in direct contrast to Klima et al.(54) who found no significant differences between the two groups.

There were similarities in findings with previously reported studies. Dorsey and Korabic found significant increases in self-image between pretreatment groups and 7-month treatment groups, as did this study. There was also agreement with Klima et al. that pretreatment males rated themselves significantly higher than females did in self-satisfaction.

Finally, there were findings not reported previously in the literature. These findings dealt with items of significance and other areas which in themselves were not significant but when noted collectively raised questions requiring further investigation.

In summary, the following items of significance were noted:

- 1) In the control group, males perceived a higher rate of teasing than did females.
- 2) In the control group, 11-12 year olds had noted more friends with braces. This frequency decreased with age.
- 3) Pretreatment males noted more friends with braces than did control males.
- 4) Pretreatment males had more enthusiasm for receiving treatment than did control males.
- 5) Males in the 13-15 year age group noted more friends with braces than did other male age groups.
- 6) There was an increased recommendation of treatment with an increase of age among males.
- 7) There was an increase in satisfaction as age increased when females performed classmate comparisons.
- 8) Females in the 13-15 year old age group perceived more compliments and were happier with receiving treatment than were 13-15 year old males.
- 9) Females 16-19 years old perceived more compliments than 16-19 year old males.
- 10) Males and females with 1 year in treatment were happier with the appearance of their teeth, smiles and classmate comparisons when compared with pre-treatment counterparts.

11) Females with 1 year in treatment perceived more compliments than did pretreatment females.

12) With an increase in treatment time, there was an increase in satisfaction with classmate comparisons and perceived compliments among females.

13) Females with one year of treatment were happier with having had braces than were males.

14) Females with 1-2 years of treatment perceived more compliments than did males in the 1-2 year treatment group.

15) Females with 2-5 years of treatment were happier with their smiles and perceived more compliments than did their male counterparts.

16) Females in retention were happier with their smiles and more satisfied with classmate comparisons than were retention males.

17) Retention males had higher responses to appearance of teeth, classmate comparisons, happiness, perceived compliments and the amount of friends with braces than did pretreatment males.

18) Retention females had higher responses to appearance of teeth, smile, overall appearance, classmate comparisons, and compliments than did pretreatment females.

Certain trends were noted and recorded. When regarded on an individual response basis, these factors showed no

significance. But when collectively observed, they displayed certain tendencies that required recognition. These trends were observed:

1) There was little difference between male and female 11-12 year olds in satisfaction and treatment response.

2) Males' self-satisfaction decreased with an increase in treatment time after the first year of treatment.

3) Females were equally happy with treatment throughout their treatment time. Males' happiness with treatment decreased after the first year.

4) There was little major difference between the 1-2 and 2-5 year treatment groups except for satisfaction with smile and perceived compliments.

5) There was little major difference between the 2-5year treatment group and the retention group except for satisfaction with smile and a slight upward trend to self-image questions.

6) The major differences noted were between the pretreatment group and the first year of treatment group.

VII. CONCLUSIONS

Historically, a patient's malocclusion and facial esthetics had been researched as to the effects that took place on society's views. Only recently have the effects on the patient's self-image begun to have been evaluated. The purpose of this paper was to determine what effect orthodontic treatment had on a patient's self-image at various stages of treatment.

A questionnaire requiring patient responses pertaining to self-image was distributed to orthodontic patients undergoing active and retentive treatment and to a pretreatment and control group. The data received was collected and statistically analyzed.

Orthodontic treatment had a definite, positive effect upon the orthodontic patient's self-image. There were significant differences in response levels of different age groups, time in treatment groups and males and females. The effects on self-image were largest during the first year of active treatment and remained at a higher level throughout treatment than when treatment first was initiated. The positive self-image levels continued through the retention phase of treatment.

It was suggested that further development of this research be continued. Ideally, a longitudinal study should be undertaken recording each individual's responses

[throughout the course of treatment. It was also suggested
that a further study might employ the use of a cooperation
factor to determine if there was a correlation between
self-image and cooperation.]

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